REPORT

TO THE LEGISLATURE OF PENNSYLVANIA,

CONTAINING A DESCRIPTION OF THE

SWATARA MINING DISTRICT,

ILLUSTRATED BY DIAGRAMS.

HENRY K. STRONG, CHAIRMAN.

Presented by Mr. M'ELWEE, and printed by order of the House of Representatives.

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REPORT, &c.

The committee appointed by a convention of delegates, which assembled at Harrisburg, from several counties of the commonwealth, on the first Tuesday of December last, in favor of the enlargement of the Union canal, were instructed to prepare a report containing a description of the Swatara Mining district, and such facts as illustrate the importance of the coal trade to the wealth and prosperity of the State, and submit the same to the Legislature.—The following is, therefore, respectfully submitted:

There are three great anthracite coal fields in Pennsylvania—the Southern, Middle and Northern. These coal fields are nearly equal in extent and similar in shape: being each between sixty and seventy miles long, and between five and six wide. The shape is slightly elliptical, being wider in the middle and narrower at the extremities.

The Southern coal field lies about nine miles north of the Kittatinny or Blue mountain, and extends from a point about nine miles west of the Lehigh, to a termination about the same distance from the Susquehanna. The natural direction of the coal to market is down the Lehigh, the Tamaqua, the Schuylkill, the Swatara and the Susquehanna.

The Middle coal field lies about ten miles north of the Southern coal field, and is parallel with it. The Beaver Meadow mines being at the eastern extremity, the coal, as well as that from other mines in the vicinity, is sent to market down the Lehigh; while the coal of the Shamokin and Mahonoy mines must pass down the Susquehanna.

A line drawn through the centre of these coal fields, from the Lehigh to the Susquehanna, would run from sixty-eight to seventy-two degrees west of south. This is the general direction of the veins.

The Northern coal field lies from twenty-five to thirty miles north east of the Middle basin, but runs in a more northerly and southerly direction—the course being north about thirty degrees east. In the south-western part is the Wyoming valley, through which flows the North Branch of the Susquehanna. The natural market for this coal is the interior of the State of New York; it will likewise be sent to the Chesapeake Bay. In the north-eastern part is the Lackawanna valley, from whence there is a rail-road sixteen miles over the mountains, and a canal from thence one hundred and five miles to the river Hudson, ninety-two miles north of the city of New York.

The Southern coal field is divided into five mining districts—the Lehigh, the Tamaqua, the Schuylkill, the Swatara and the Susquehanna. These mining districts are separated from each other by the summits which divide the waters that drain the coal basin. Within the coal field are several mountain ridges, in which the veins of coal are deposited, running nearly parallel with each other.—These are called by different names in the several mining districts: thus in the Schuylkill district, they are called the Sharp mountain, the Peach mountain, the Oak ridge, the Mine hill and the Broad mountain; while they are called, in the Swatara district, the Sharp mountain, the Red mountain, the Coal mountain, the Little Lick mountain, the Big Lick mountain, the Thick mountain and the Broad mountain. The several streams which rise in the coal basin, have broken through these several mountains at convenient distances for mining the coal at the gaps, and in their course to the creeks and rivers which they form, have carried down the earth, until, in the course of time, they have worn down channels between the mountains, forming summit levels amounting to barriers between the Lehigh and Tamaqua—the Tamaqua and Schuylkill—the Schuylkill and Swatara—and the Swatara and Susquehanna. These form the five mining districts in the Southern coal field.

THE LEHIGH DISTRICT.

The Lehigh mining district comprises the eastern extremity of the coal field, and is the smallest of the five. It is owned exclusively by the Lehigh coal and navigation company. No individuals mine coal in this district. About four miles from the Tamaqua, and nine from the Lehigh, are the summit mines, which are on an ave-

rage about sixty feet thick. They lie horizontal upon the top of the Sharp mountain, and have a covering of earth and stone from ten to twenty feet thick. This mass of coal which seems to be composed of several veins united, with small veins of slate between them, is mined by uncovering and quarrying. From ten to fifteen acres have been uncovered. North of the summit mines upon Room run, a number of veins have been opened and extensively worked.

There are two rail-roads in this district; one from the summit, and the other from the Room run mines to Mauch Chunk upon the Lehigh. From this place, there is a canal forty-six and three-fourth miles in length, calculated for boats of one hundred and fifty tons burden, to Easton upon the Delaware. From this place, the coal can either be carried on the Morris canal to Newark, through New Jersey, and shipped from there to New York; or can be transported down the Delaware division of the Pennsylvania canal to Bristol, and shipped from thence to Philadelphia. The coal trade had its commencement here—regular operations commencing five years sooner than upon the Schuylkill.

The following shows the quantity of anthracite coal mined and sent to market from the commencement of the trade:

Years.	Tons.	Years.	Tons.
1820,	365	1830,	41,750
1821,	1,073	1831,	40,966
1822,	2,240	1832,	75,000
1823,	5,823	1833,	123,000
1824,	9,541	1834,	
1825,	28,393	1835,	
1826,	31,280	1836,	
1827,	32,074	1837,	192,595
1828,	30,023	1838,	152,696
1829,	25,110		

THE SUSQUEHANNA MINING DISTRICT.

The Susquehanna mining district comprises the western end of the Southern coal field, about eighteen miles from its western extremity; while the Little Lick, Coal, Red and Sharp mountains continue their course nearly parallel with the Blue mountain. The two northern ridges, the Big Lick and the Thick mountains, diverge to the north, and form a narrow but separate coal basin. The western part of this basin forms the Susquehanna mining district, which the smallest of the five in the coal field, with the exception of the

Lehigh. It is bounded on the north and west by Lykens valley; on the south by Williams' valley, which separates the coal field into two parts; and on the east by the high land, which separates the head waters of the Swatara from those which flow into the Susquehanna. This mining district contains about thirteen square miles: being about thirteen miles long and a mile wide. The two mountains, which compose this district, contain different varieties of coal, the veins in the South mountain being red ash, and those in the North white. They are separated only by a narrow valley, and they unite into one ridge about two miles from its western termination. At the place of their union, Western Bear creek, which rises about four miles further east, and near the Dauphin and Schuylkill line, breaks through the South or Big Lick mountain, and runs into the Wisconisco, a tributary of the Susquehanna. This place is called Bear Gap, and is the location of the Lykens valley coal company, that own the only mines now worked in the Susquehanna mining district. From this place, a rail-road has been constructed by another company, without mining privileges, sixteen miles to Millersburg upon the Susquehanna, at an expense of about $70,000. From this place, the Lykens valley coal company are obliged to take their coal across the Susquehanna, in flats, to the Pennsylvania canal; but this expense will be saved when the Wisconisco canal, now under contract, is finished from Millersburg to Duncan's island. This company mine about seven or eight thousand tons annually; their coal is a very free burning coal, much softer than in other parts of the coal basin farther east. Its greatest fault is that it becomes fine by transportation. About eight miles farther east, there is another out-let from this mining district. Eastern Bear creek rises near the source of Western Bear creek, and runs east until it meets Western Roush creek from the east, when both streams unite and break through the North or Thick mountain, and flow into Pine creek, a branch of the Mahantango, a tributary of the Susquehanna. This place is called Klinger's Gap, from whence, if a rail-road of about twenty-four miles in length were made, it would connect this end of the district with the State works upon the Susquehanna.— There are several veins in this gap, some of which are of the largest kind; and the coal, although white ash, is of an excellent quality.

THE TAMAQUA MINING DISTRICT.

This district lies east of the Lehigh, and upon the waters of the Tamaqua or Little Schuylkill, which rises on the summit between the Southern and Middle coal fields, and runs south, across the coal measures, through the Broad mountain on the north and the Sharp mountain on the south. It has its source within one hundred yards of Beaver Meadow creek, which runs northwardly into the Middle coal field. This district is much larger than either the Susquehanna or the Lehigh, and can send a much larger quantity of coal to market than either; but its coal trade, instead of increasing, seems to be declining. In 1833, there were mined and sent to market from the district, 37,506 tons; in 1837, 31,520 tons; and in 1838, only 11,430 tons. This decline is probably owing to two causes:—the first is the length of the rail-road, twenty miles being equal to eighty of canal of the capacity of the Schuylkill—the second is that the rail road is in the hands of a company, which has mining privileges, possessing the right to charge such tolls, and impose such restrictions upon others, as shuts up this valuable district to all but the company. The mines are reached by a rail-road up the Tamaqua from Port Clinton. From Port Clinton, the coal is shipped on the Schuylkill navigation to Philadelphia.

THE SCHUYLKILL MINING DISTRICT.

This district is about as large as the Tamaqua and Lehigh districts united. It is bounded on the east by the summit, which divides the waters of the Tamaqua from those of the Schuylkill, and on the west by the dividing ridge between the Schuylkill and the Swatara. It is about eighteen miles long and between five and six broad.

Mining operations commenced in this region in 1825, five years after operations had been commenced upon the Lehigh, and 5,306 tons of coal were sent to market the first year. In 1815, commenced a canal from Philadelphia to the coal region, which was finished to Pottsville, one hundred and six miles, in 1824. This canal admits boats carrying from fifty-five to sixty tons of coal, and is already the most profitable canal in the United States. The income of the company is so large, that they ought to build more reservoirs to supply the canal in summer, and to reduce the tolls, depending upon an increased tonnage to supply the deficiency of revenue. From the canal, rail-roads have been made in every direction into this

mining district, some of which divide as high as eleven per cent. upon their capital. The cost of these rail-roads has been estimated in a report of a committee to the Senate of Pennsylvania, to be nearly a million of dollars.

There are two companies with mining privileges, which mine and send coal to market from this district, and a third was incorporated at the last session of the legislature; but having no control over the canal or the rail-roads, this district, unlike those of the Tamaqua and the Lehigh, is thrown open to individual enterprize, and more than three-fourths of the coal is mined and sent to market by individual operators. The consequence of this freedom has been the introduction of wealth, science, industry, the building of towns and villages, and the permanent settlement of thousands, in the place of a few impoverished hunters, that a few years ago wandered, in ignorance and solitude, over these mountains of mineral wealth.

In order that some idea may be formed of the amount of capital, invested in the public works connecting the mines of this district with Philadelphia, and capital employed in mining and transporting coal, we subjoin the following:

Capital in the canal and rail-roads.

	Miles.		
Schuylkill navigation, from Philadelphia to Port Carbon,	108	$2,966,180 00	
West Branch rail-road,	15	185,000 00	
Schuylkill valley rail-road,	10	60,000 00	
Mount Carbon rail-road,	9	95,000 00	
Mill creek rail-road,	4	15,000 00	
Lateral rail-roads above ground,	38	100,000 00	
Rail-roads under ground,	45	18,000 00	
	199		$3,439,180 00

Capital in mining and transporting.

Eight hundred and thirty-one canal boats, with horses, tackle, &c.,	$984,375 00	
Seventeen hundred and twenty-five large freight wagons for rail-roads,	129,000 00	
One hundred and twenty-nine collieries, including drift wagons and fixtures,	258,000 00	
Ten steam engines, with apparatus,	150,000 00	
		$1,421,375 00

Capital in real estate.

Sixty thousand acres of coal land, averaging $60 an acre,	$3,000,000 00	
Towns built for the accommodation of the mining population, and wharves,	2,500,000 00	
		5,500,000 00
Total amount,		$10,360,555 00

The ten steam engines used for raising coal from below the water level, are owned by the following persons:

Two by George H. Potts, on the Tunnel and Black mine veins in the borough of Pottsville.

One by Potts and Bannan, on the Tunnel, Black mine and Lawton veins in the borough of Pottsville.

One by Samuel Lewis, on the Salem vein in the borough of Pottsville.

One by Charles Ellet, on the Salem vein at Port Carbon.

One by Francis B. Nichols, on the Lewis vein, two miles up the Valley rail-road.

One by William Wallace and company, on the same tract.

One by John Stanton, on the Black mine at the West Branch.

Two by the North American coal company, on the Spohn vein.

There are, according to the Miners' Journal, about one hundred and twenty other collieries, which have this year been worked above the water level, several of which will be obliged to use engines another year.

The following exhibits the amount of coal which has been mined and sent to market, during each year from the commencement of operations in this district. It includes also the amount mined on the Tamaqua, which is very small.

Years.	Tons.	Years.	Tons.
1825,	6,500	1832,	209,271
1826,	16,767	1833,	252,971
1827,	31,360	1834,	226,692
1828,	47,284	1835,	339,508
1829,	79,973	1836,	432,045
1830,	89,984	1837,	523,152
1831,	81,854	1838,	431,719

The committee take great pleasure in calling the attention of the legislature to this glowing picture of this interesting section of the

Commonwealth, as it shows the importance of extending the public works to every mining district of the State, as the sure means of paying the State debt, enriching the public treasury, and making us a great and prosperous people.

Besides supplying the country along the canal in 1837, with 28,775 tons of coal, and the city of Philadelphia with 79,916 tons, there were shipped to other parts, in three thousand and seventy vessels, of the Schuylkill coal 328,304 tons. The following facts show the importance of the coal trade to Philadelphia, and consequently to Pennsylvania. By an account of the number of arrivals, at Philadelphia, of vessels engaged in the foreign trade, it appears that there has been no increase for the last fifty years. There are no more arrivals now than in 1778. But the coasting trade has increased beyond parallel, and is destined to increase, so long as the coal trade continues, until her commerce surpasses every city in the Union. In 1787, the number of coasting vessels which entered the port of Philadelphia, was only *three hundred and ninety;* in 1838, the number amounts to *ten thousand, eight hundred and sixty-eight!*

THE SWATARA MINING DISTRICT.

As the committee were appointed to give a particular description of the mining district upon the Swatara and its branches, they have preceded it with brief notices of those upon the Lehigh, the Tamaqua, the Schuylkill and the Susquehanna, lying in the same coal field, in order that the relative importance of this district may be better appreciated, and its description more clearly understood.

It extends from the high land on the east, which divides the waters of the Schuylkill from those of the Swatara, to the summits on the west, which separate the waters of the Swatara from those of the Susquehanna, and from the base of the Sharp mountain on the south, to the base of the Broad mountain on the north. It averages about eighteen miles long by six broad, containing about one hundred and eight square miles, or sixty-nine thousand, one hundred and twenty acres of coal land.

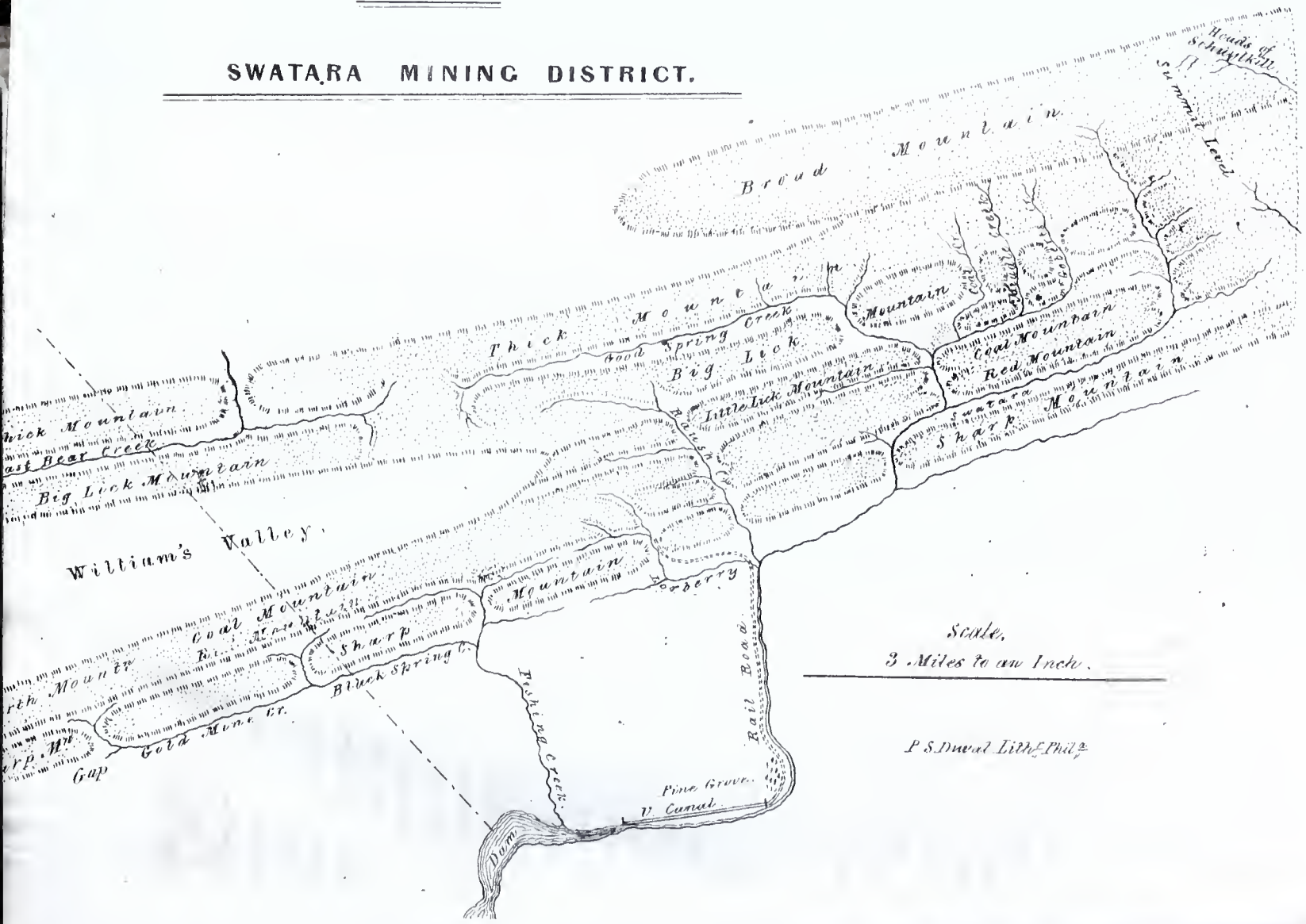
In this mining district there are seven mountains, from three to eight hundred feet in height, running parallel or nearly so, separated by narrow vallies; which, in some places remote from the streams, are nearly level with the mountain ridges, but which, near the gaps,

are worn down by the water courses which drain the coal basin. In these high ridges are deposited the veins of coal: they are called the Sharp mountain, the Red mountain, the Coal mountain, the Little Lick and Big Lick mountains, the Thick mountain and the Broad mountain. The Swatara or its branches have broken through all these ridges, with the exception of the Broad mountain, which it also penetrates, making thirty-six gaps or breaks through the several mountains where mining operations can be carried on, on each side, above the water level.

The shape of this region, the position of its mountains, and the several creeks breaking through them, thus affording opportunities for mining, and constructing rail-roads in every part, will be better illustrated by Diagram No. 1.

No. 1.

SWATARA MINING DISTRICT.



THE BREAKS THROUGH THE MOUNTAINS CAUSED BY THE SWATARA AND ITS TRIBUTARIES.

The Swatara runs more than ten miles in the coal region. It rises on the high table land of the Broad mountain, near the head waters of the West Branch of Schuylkill, and running south, breaks through the Broad, the Thick, Big Lick, Little Lick, Coal, Red and Sharp mountains, making seven gaps, where every vein in the coal field can be worked to the right and the left.

Good Spring creek also runs about ten miles in the coal field. It rises in the Big Lick mountain, cuts across it, and then runs east several miles, when it turns to the south and breaks through the Big Lick, Little Lick, Coal and Red mountains, and unites with the Swatara. It makes five breaks for mining operations: besides these, there are three gaps, formed by streams which rise in the Thick mountain and empty into Good Spring creek, above its last passage through the Big Lick mountain. These are Bailey's run, Martin's run and Wilson's run.

Middle creek rises on the high ground, between the Broad and Thick mountains. It runs south, cutting across the Thick, Big Lick and Little Lick mountains, when it turns and runs west into Good Spring creek. It makes three deeply cut gaps for mining.

Coal creek and Gebert's creek both have their sources in the Thick mountain, and running south, cut deeply through the Thick, Big Lick and Little Lick mountains, when they unite with Middle creek. These two streams make six gaps in the mountains.

Roush creek rises near the source of Good Spring creek, and breaks through Big Lick, Little Lick, Coal, Red and Sharp mountains, thus making five mining gaps. There is an immense amount of coal on this creek above the water level, in consequence of the mountains being unbroken for miles on each side, and the number of veins discovered from six to twenty feet thick, with five and six hundred feet breast.

Fishing creek rises in the valley between the Sharp and Red mountains. Cutting across the Sharp mountain, it runs southerly and flows into the Swatara at the basin formed by the little dam of the Union canal company. It has only one gap. The coal in the Red mountain, near this gap, must be mined by tunneling. As there are some partial breaks caused by small streams, and the veins dip to the south, the expense of tunneling will not be great.

Gold Mine and Black Spring creeks are small streams, rising near the western extremity of the coal basin near the summits of the Red and Sharp mountains. They both partially break the Sharp, and falling between three and four hundred feet before they reach the valley at its southern base, they flow together and run into Fishing creek. These two gaps and the land in their vicinity are owned by the Dauphin and Susquehanna coal company, who have expended large sums of money in opening and proving the veins.

Lorberry creek rises in the Coal mountain. It breaks partially through it, and also through the Red mountain, and cuts deeply across the Sharp mountain; after which it runs about a mile and a quarter, and flows into the Swatara. Western Lorberry also partially breaks the Red mountain, and then unites with the main branch in the valley between the Red and Sharp mountains. Here are four gaps for mining coal.

A rail-road has been constructed from the termination of the Swatara rail-road, up Lorberry creek two miles and a half, to the foot of the Coal mountain. About one mile and a quarter lies in the coal region. This is the only rail-road that extends into the Swatara mining district. It was mostly constructed by the land owners on this creek, and was finished with a single track in 1833. From the foot of the Red mountain to the extremity of the road, a little more than half a mile, there is an inclined plane with an elevation of more than three hundred feet to the mile.

There are three collieries on this creek, and the only ones in the Swatara mining district. Stees and Oliver are operating on a vein in the Red mountain, nearly at the head of the inclined plane; they commenced operations before the completion of the rail-road, mining their coal and hauling it in wagons to the feeder of the Union canal. Holmes, Ley and company are mining in the Sharp mountain, and commenced in the spring of 1837. Strong and Krause are also mining in the Sharp mountain, and commenced operations in April last.

Stees and Oliver, and Holmes, and Ley and company mined in 1837, and sent to market nearly seventeen thousand tons.

THE COAL MOUNTAINS.

THE SHARP MOUNTAIN lies next to the southern boundary of the coal field. Its length, in the Swatara mining district, is more than twenty miles, rising, in some places, to an elevation of more than eight hundred feet from its southern base. On the west side of Lorberry creek gap, the pinnacle called the Panther's head is seven hundred and twenty-five feet higher than the rail-road, and this height increases, westward, until it reaches the summit level between Fishing creek and the Lorberry. Unlike the Sharp mountain upon the Schuylkill, where the great southern conglomerate rock is in the centre, resting upon the red shale which forms the southern part of the mountain, the Sharp mountain of the Swatara has the great conglomerate at its southern base, the whole mountain lying within the coal measures. The irregularity of the Schuylkill district is also unknown here; there are no "*horizontal heaves*" or derangement of the coal measures. The veins at Lorberry creek, as has been proved by the openings made during the past year, run directly across the creek, from the mountain on one side to the mountain on the other. Their course, on both sides of the gap, is north sixty-eight degrees east—those in the southern half of the mountain having a south dip of about seventy-four degrees, and those in the northern half of about sixty-seven. The coal of the Sharp mountain veins on Lorberry creek is of the red ash variety. It is a free burning coal, ignites easily, leaves but little residuum, burns with a bright yellow blaze, without smell or smoke, and is an excellent article for black-smithing as well as for parlor purposes.

Diagram No. 2, exhibits the veins of coal by a geological section across the Sharp mountain, at Lorberry creek. It is an end view of the Panther's head on the west side of the gap.

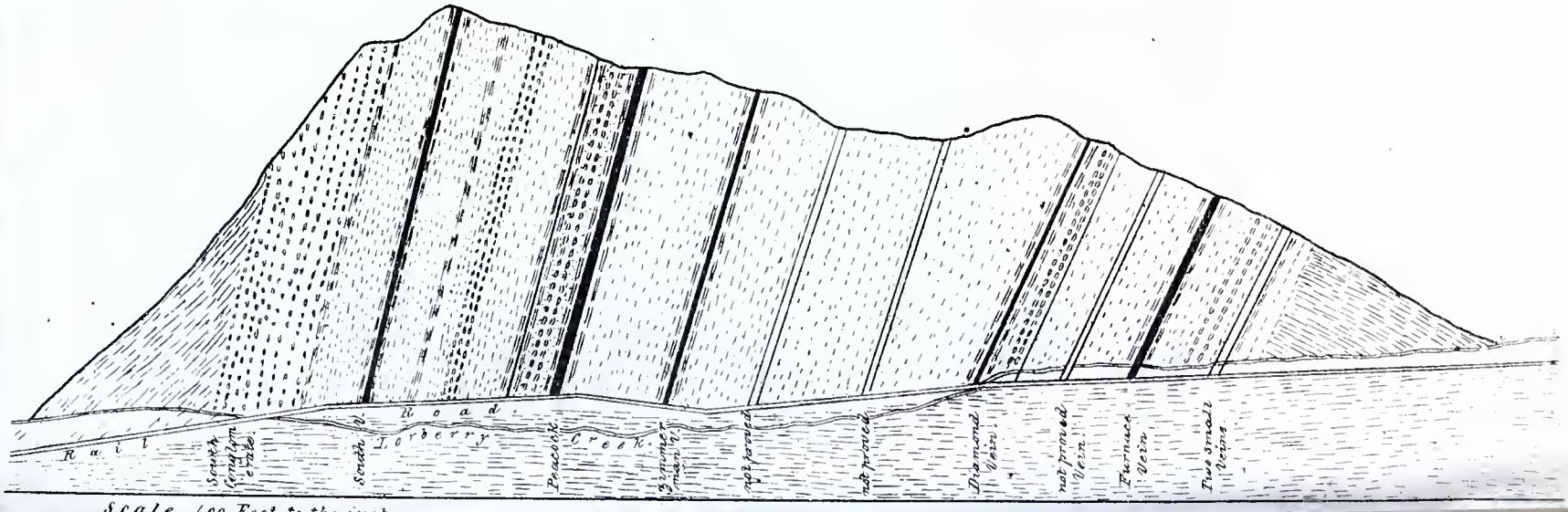
Table explanatory of Diagram No. 2.

	Ft. between the veins.	Total feet.	Thickness of veins.
South conglomerate about 120 ft thick.			
From South conglomerate to South vein,	180		5
From the South vein to the Peacock vein,	360	540	8
From the Peacock to the Zimmerman vein,	213	753	4
From the Zimmerman to the Diamond vein,	627	1380	3
From the Diamond to the Furnace vein,	300	1680	6

There are several other veins which have not been proved.

No. 2.

SHARP MOUNTAIN.



Scale—400 Feet to the inch.

The South vein was some years ago opened on Roush creek, and the coal hauled on wagons to Pinegrove. It has not yet been opened on the Lorberry, at the water level, although it has been found in several places on the top of the mountain, where it has the appearance of being a good vein of about five feet thick.

The Peacock vein was opened on the east side of the Lorberry several years ago, and the coal sold to persons in the neighborhood, or hauled to market on wagons. It was opened on the west side of the creek, in April last, by Strong and Krause, who have mined since about two thousand tons. It has now about eight feet of coal, with a breast of seven hundred feet. Ten thousand tons can easily be mined in this vein annually.

The Diamond vein. This vein has about three feet of solid coal. It has a south dip of about sixty-seven degrees. It was opened on the east side of Lorberry, about three years ago, by Henry Umbehauer, but has been worked for the last two years by Holmes. Ley & Co., who calculate, the coming season, to take out of it ten thousand tons of coal. It was opened in August last by Strong and Krause, in the Panther head, on the west side of Lorberry, who will be prepared to mine an equal amount. The coal of this vein is unequalled, as it respects solidity and purity. On both sides of the gap it has, as yet, been entirely free from faults.

The Furnace vein has been opened on the east side of the Lorberry, by Holmes, Ley & Co. The coal seems to be softer than that of the Diamond vein; but it has not yet been worked far enough to prove its character.

There are several other veins in the Sharp mountain which have not been tested.

The following geological sections across the Sharp mountain, at Gold mine, and Black Spring creeks, have been furnished by R. C. Taylor, agent of the Dauphin and Susquehanna coal company. The veins on these creeks are verticle.

Gold Mine Gap.

	Spaces between the veins.	Total.
South conglomerate, 50 feet thick and verticle.	Feet.	Feet.
To crop of vein not proved.	129	129
Second crop not proved.	90	219
The 4½ feet vein.	60	279
Coal vein and drift.	160	438
Crop of coal.	369	808
Drift on Heister vein, 9 feet.	105	913
The Grey vein, 10 or 12 feet.	120	1033
Vein not drifted.	165	1198

Black Mine Gap.

	Ft. between the veins.	Total feet.
Centre of verticle conglomerate, 50 feet.		
To trace of Southern vein.	70	70
The 4½ feet vein—drift.	100	170
Vein not opened.	140	310
Vein supposed to be the Peacock.	244	554
Heister vein 9 feet thick.	272	826
Grey vein 14 feet thick.	95	921

RED MOUNTAIN.

The Red mountain lies north of the Sharp mountain, and is separated from it by a deep valley, except in the western part which lies in the county of Dauphin; where the valley becomes filled up and the two mountains unite into one. It is a continuous high ridge, and runs the whole length of the mining district; rising in some places to an elevation of more than five hundred feet from its southern base. The veins, in this mountain, have a southern dip, with the exception of those in the narrow strata on the northern slope, and their inclination varies from thirty degrees to nearly perpendicular. The coal is of the red ash variety, in all the veins having a southern dip. Those having a northern dip, are partly red and partly white ash.

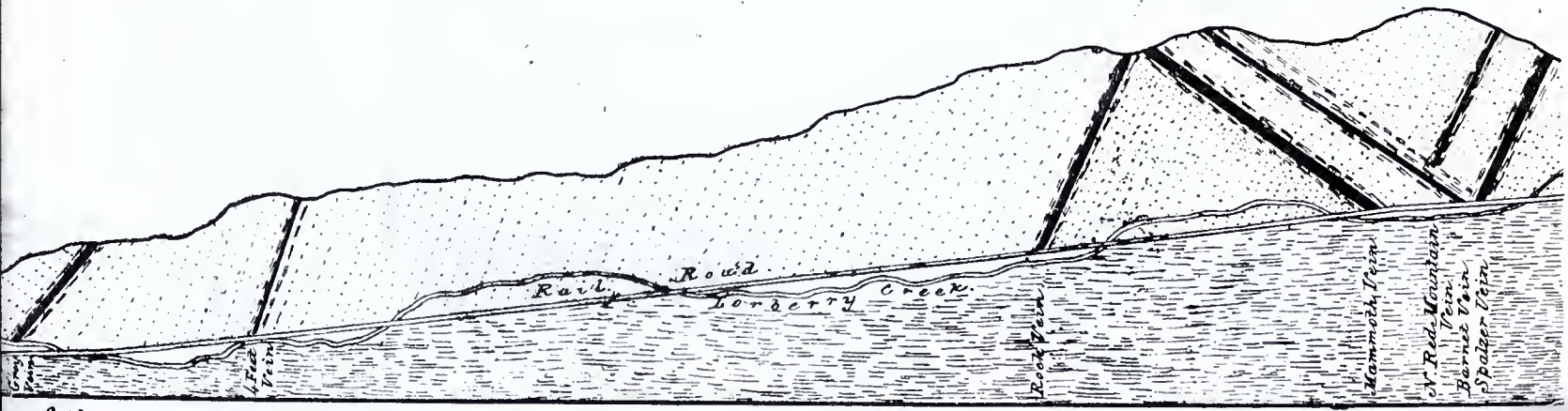
Diagram No. 3, is a geological section across the Red mountain.

	Ft. between the veins.	Total feet.	Thickness of veins.
From the Furnace vein in the Sharp mountain, to the Grey vein 1280 feet,			12
From Grey vein to 4 feet vein,	480		11
From 4 feet to Rock vein,	not asc'td.		20
From Grey vein to Mammoth vein,	1295		30
From Mammoth to North Red mountain,	200	2395	8
From North Red mountain to Barnitz vein,	Not ascertained.		6
From Barnitz to Spatzer vein,	do		14

There are several other veins in this mountain which have been discovered; but not being opened in the gap the distances between them are unknown.

No. 3.

RED MOUNTAIN.



Scale — 400 Feet to the inch.

P. S. Duval Lith. Phila.

It will be seen by the diagram, that Lorberry creek breaks the Red mountain very imperfectly. It is cut down to its base by the Swatara, Good Spring creek, and Roush creek; and on the latter several veins have been discovered, which have not yet been found upon the Lorberry.

The Grey vein, near the southern base of the Red mountain, was opened several years ago upon Western Lorberry, and the coal mined and sold to persons who hauled it away on sleds and wagons. It has twelve feet of solid coal.

The four feet vein has been opened by sinking a shaft on the top of the mountain, where the coal is solid.

The Rock vein was opened in 1837, by Holmes, Ley & Co. It is a very large vein, varying from twenty to thirty feet in thickness; it has not been sufficiently worked to prove the coal. As the mountain was broken, and depressed where it was opened, the coal was soft. It may be a good vein where the mountain is higher, and more regular, and also when worked with an engine below the water level.

The Mammoth vein is one of the largest in the coal region. It is about thirty feet thick from slate to slate. It has two benches of coal, with the undermining in the middle; each bench is from ten to twelve feet thick. This vein has been worked by Stees and Oliver, with great success, during the last three years. Last year, there was taken out of it about ten thousand tons. Those who are now working it, have assured the committee that they can mine and take from this opening fifty thousand tons annually.

The North Red mountain vein was opened by Holmes, Ley & Co. It is about six feet thick.

The Barnet vein was opened several years ago by sinking a shaft on the top of the mountain. The vein is about six feet thick, and the coal is said to be of the very best kind. It has not yet been opened at the rail-road on Lorberry creek.

The Spatzer vein. This vein is about fourteen feet from top to bottom. It has been found by sinking shafts in several places on the top of the mountain, and traced during the past year, down to the Lorberry gap, where Strong and Eckert are now opening it by a drift. It has a superior red ash coal, and promises, when opened, to be a very productive and profitable vein.

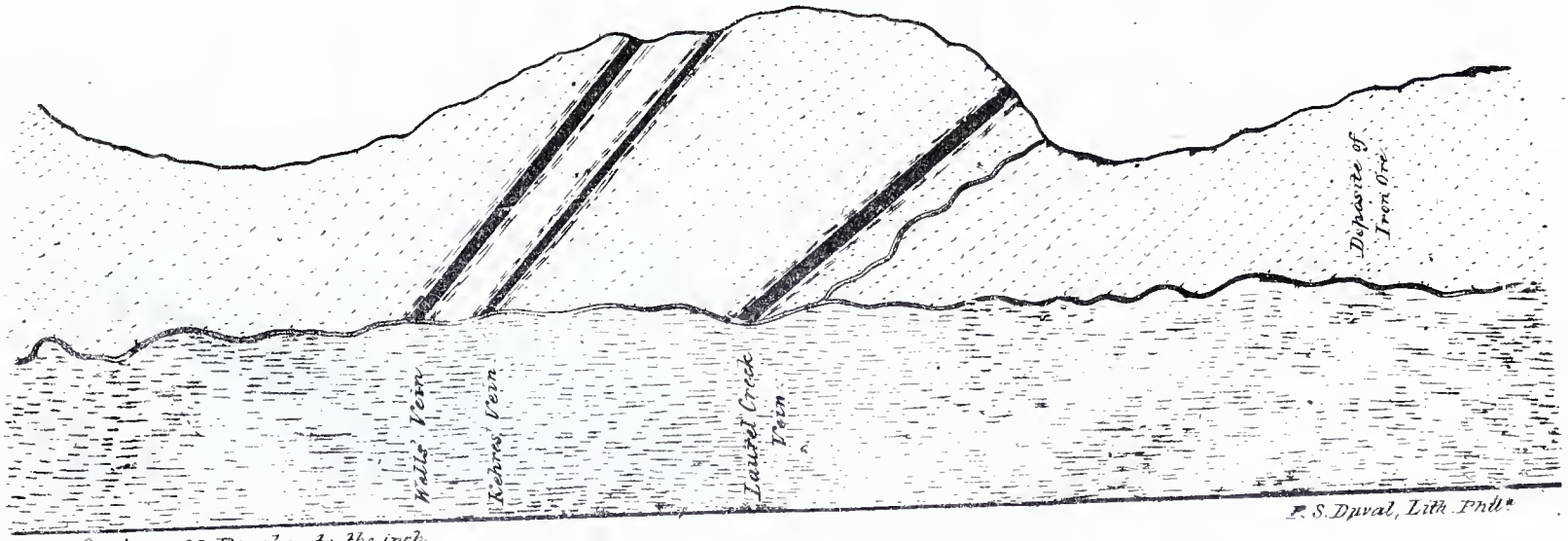
COAL MOUNTAIN.

The coal mountain lies next in order, north of the red mountain, and in some places unites with it; forming but one broad ridge with a small depression in the middle. It is broken deeply by the Swatara, Good Spring and Roush creeks, but only partially by the Lorberry, where the best veins must be reached by a tunnel. There are undoubtedly several veins in this mountain, but only three have as yet been discovered; all of which are superior, both as it respects size and the quality of coal. They are all of the red ash variety.

Diagram No. 4, is a geological section across the Coal mountain, on Raush creek.

No 4.

COAL MOUNTAIN.



Wells' vein was opened before the Lorberry creek rail-road was made, by Moses Wells. The vein is fourteen feet thick, from top to bottom, and contains one large bench of excellent coal. The coal was mined and hauled to Pinegrove, on wagons; but in consequence of the expense attending such a mode of transportation, and the unsettled title of the lands, this and other veins on this creek are now not worked.

Kehres vein. This vein was opened by Philip Kehres. It is about six feet thick. It contains coal of the first quality. It is easily mined, and is free from impurity.

The Laurel creek vein. This vein will rank among the first in the coal region. It is about eighteen feet thick, and contains as much solid coal as any before mentioned. It has been opened by three drifts on Raush creek, and a large quantity of coal has been taken out and hauled on sleds and wagons to market. This vein has been traced over to the Lorberry, where a tunnel has been commenced by Graeff & Co., in order to reach it. Near the mouth of Laurel run, upon Raush creek, it crops out—the solid coal being exposed to view like a ledge of rocks.

The coal of this vein, as well as that of the Kehres and Wells' vein, although of the free burning, red ash kind, is somewhat harder than the more southern veins, and is not so much wasted by transportation.

LITTLE LICK MOUNTAIN.

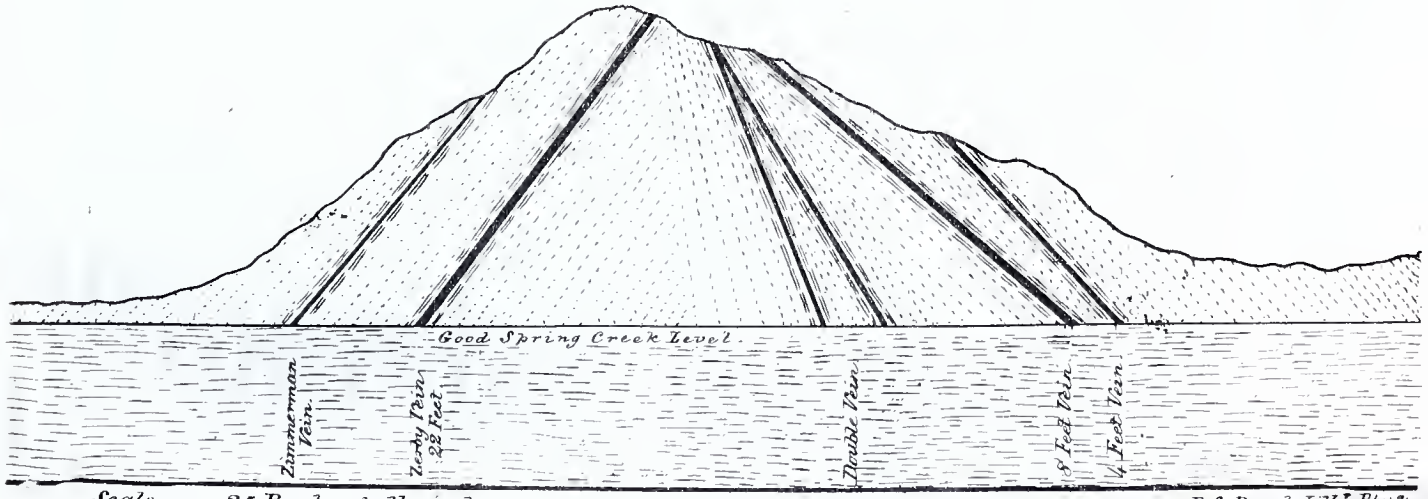
The Little Lick mountain lies in the middle of the coal field, directly north of the Coal mountain. It is the smallest of the whole seven, from its eastern extremity to the heads of Poplar run, west of Good Spring creek, but it rises to a great height at the Raush creek gap, and continues increasing in size to its western termination near the head waters of Good Spring creek, Raush creek, the Wisconisco and the Lorberry. Here the Little Lick mountain terminates upon the red shale of Williams' valley, while the Big Lick and Sharp mountains diverge about ten degrees to the west, and pursue their course to a termination in Lykens valley, about nine miles from the Susquehanna: and the Sharp, Red and Coal mountains continue nearly their former course, and end about the same distance from the same stream.

Little was known of the veins in these mountains until the last summer, when several excellent veins were found by Levan, Donaldson & Co. It is, however, yet but partially explored.

Diagram No. 5, is a geological section across the Little Lick mountain, east of Good Spring creek, exhibiting the veins that have been discovered.

No. 5.

LITTLE LICK MOUNTAIN.



Scale. — 25 Perches to the inch.

P.S. Duval, Lith.r Phil.a

The Zimmerman vein was opened several years ago by Henry and Peter Zimmerman, in Poplar run, a tributary of Good Spring creek. It was opened by a tnnnel into the side of the mountain, where the vein was reached with little expense. It contains about six feet of good coal. The expense of mining and hauling on sleds and wagons to market, put an end soon to the operations.

The twenty two feet vein, called sometimes the Zerby vein has been opened on this mountain, near the head waters of Poplar run; about one mile west of Good Spring creek. The coal which was taken out several years ago still lies near the opening, and has the appearrnce of being first rate in quality.

The Double vein is about fourteen feet thick, and seems to be composed of two veins of different dips, uniting at the opening.

The eight feet vein is a most valuable mine. It contains eight feet of solid coal without the least impurity.

The four feet vein is also an excellent vein, containing a beautiful coal with a square fracture.

These veins are all of the red ash variety. The coal in the two last and the Zerby vein, does not differ very materially from that of the veins of the Coal mountain.

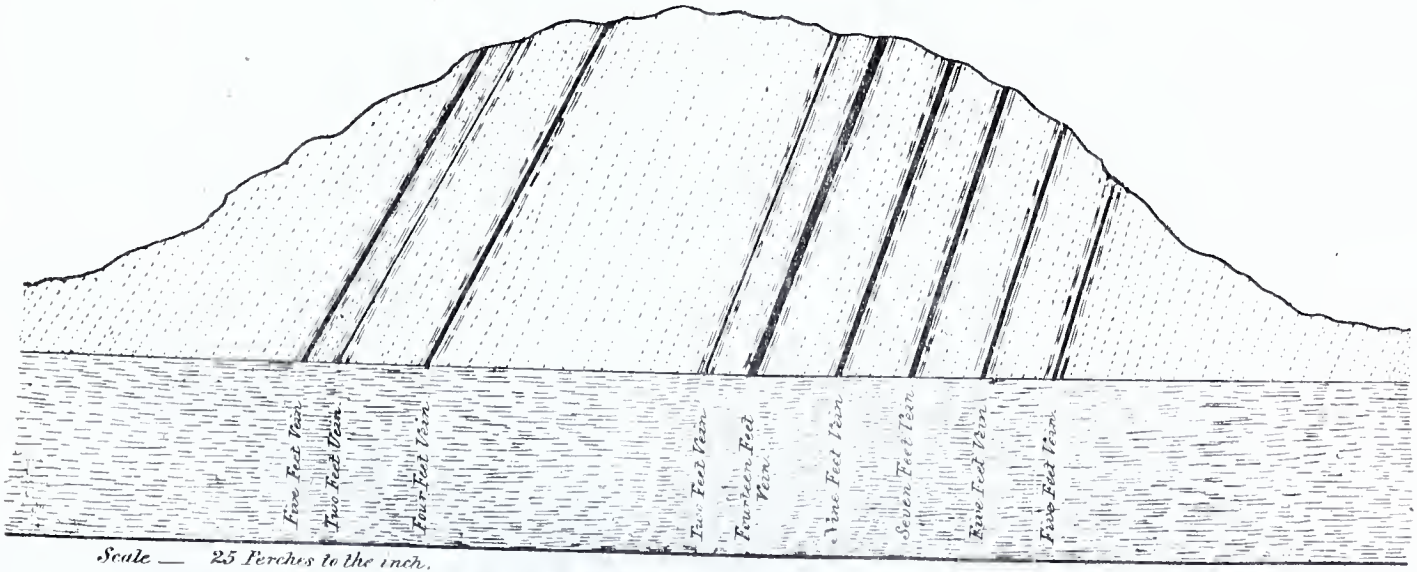
BIG LICK MOUNTAIN.

The Big Lick mountain takes its name from Lick run, which rises in the valley between this and Little Lick mountain, and flows east into Good Spring creek. It is a high, regular ridge, commencing at the eastern extremity and running the whole length of the mining district. From the place where Good Spring creek breaks through it, there is a divergency of about ten degrees to the west, forming with the Thick mountain, a distinct coal basin. In this coal basin, lying upon the heads of Good Spring creek, th veins in this mountain dip to the north, while at the Good Spring creek gap, and east of it, they dip to the south.

Diagram No. 5, is a geological section across the Big Lick mountain, at the Good Spring creek gap, exhibiting the position of the veins which have been lately discovered there by Levan, Donaldson, & Co. and also two which have been opened in the same mountain, by John Huber, on the Swatara. The committee do not, in this diagram, pretend to accuracy as to distance.

No. 6

BIG LICK MOUNTAIN.



Scale — 25 Perches to the inch.

P. S. Duval, Lith.r Phil.a

The FOURTEEN FEET VEIN has been opened by John Huber, on Swatara. It is represented as a first rate vein.

The NINE FEET VEIN, has also been opened on Swatara, and coal taken out and sold to persons in the neighborhood, by John Huber. This vein has nine feet of solid coal.

The THREE FIVE FEET VEINS, and one FOUR FEET VEIN, opened by Levan, Donaldson & Co. have been proved during the summer. They have in the aggregate, nineteen feet of solid coal.

There has been a vein of ten feet in thickness, of solid coal of the best quality, opened in this mountain, upon Roush creek, but whether it is one of those opened by Levan, or Huber, the committee are unable to say. All of the veins in this mountain are Red ash, but the coal is harder, than that in the mountains south of it.

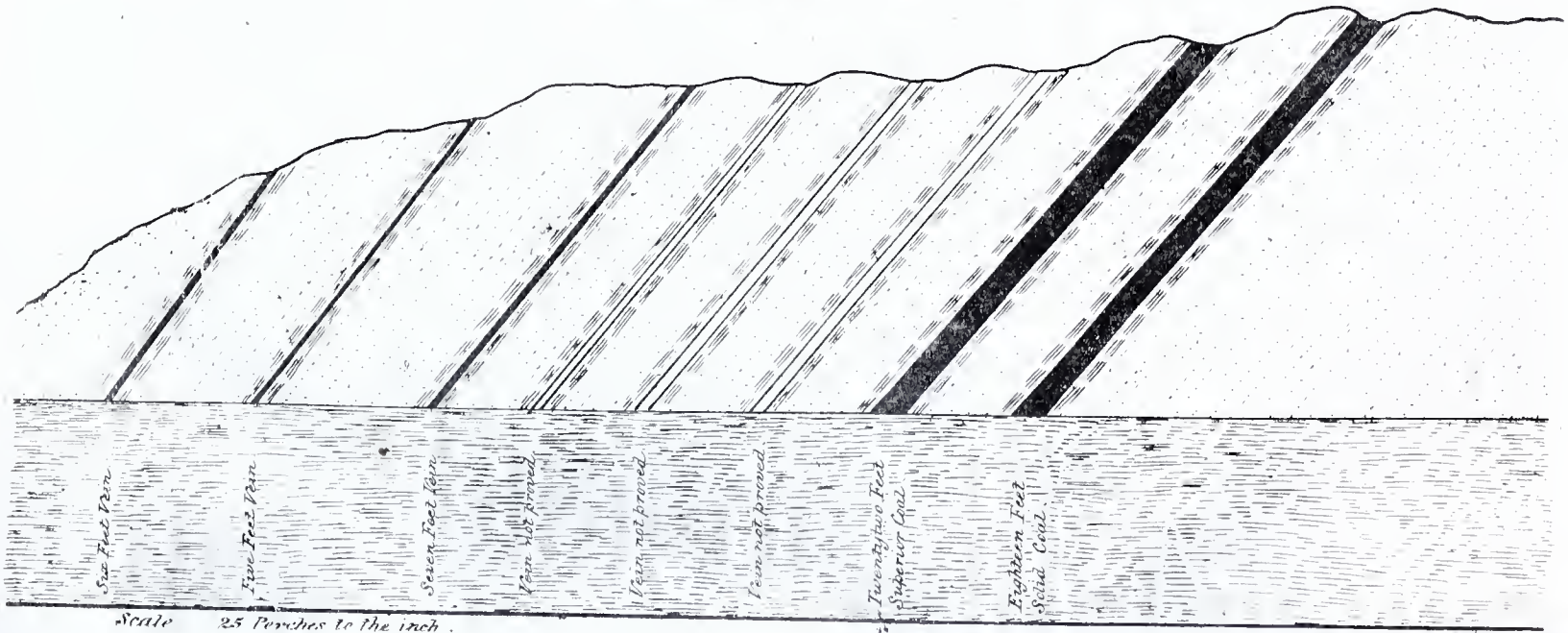
THICK MOUNTAIN.

The THICK MOUNTAIN is a high ridge of great thickness, except in the western end of the mining district, where it still keeps its elevation, but becomes somewhat narrower. It runs the whole length of the mining district, parallel with the Big Lick mountain. At the Swatara gap, it is, at least, a mile in thickness. In this mountain are found the large white ash veins. The coal is hard, but much more inflamable, than the white ash coal, from other mining districts farther east. The exploration of this mountain is yet to be made.

Diagram No. 7, is a geological section across the southern half of the Thick mountain, on Martin's run, which runs into Good spring creek, before its last break through the Big Lick mountain. It exhibits the position of the veins, lately discovered by Levan, Donaldson, & Co. As the committee had no opportunity of measuring, they do not pretend to accuracy, as to the distance between the veins in the Diagram.

No. 7

THICK MOUNTAIN.



The thickness of the veins, represented in Diagram No. 7, is not the distance from top to bottom slate, but the actual thickness of solid coal. The twenty-two feet vein has been found, and opened in several other places on this mountain, from ten to fifteen miles distant from each other. The size of the vein is every where the same, and the quality of the coal, at each opening, superior.

BROAD MOUNTAIN.

The Broad Mountain lies north of the Thick mountain, and is the northern boundary of the coal field. It extends from the western boundary of the Schuylkill mining district, about ten miles into the Swatara district, where it comes to a termination. It is penetrated by the Swatara, but no means have yet been taken, to ascertain its mineral wealth, within this district. That it has a great number of large and very superior veins, upon the Swatara, is evident, from the operations two or three miles further east, upon the waters of the Schuylkill.

The committee have now briefly, and from the difficulty of the task, imperfectly embodied such facts, in relation to this mining district, as personal observation, has enabled them to collect. It is not probable, that more than half the veins, have yet been discovered. The operations of the miner, are necessary to develope the hidden wealth, that lies buried in these mountains. About forty veins, from three to more than twenty feet in thickness, of solid coal, have been opened. and more than one half of them have been discovered within the last year. Each of the seven mountains, probably contains upon an average, from ten to fifteen veins, which will be worked. Take the lowest number, and there will be seventy veins. In the Schuylkill district, according to the letter of Isaac Lea, to Nicholas Biddle, there are between ninety and one hundred veins, that will be found worth working; and it is probable that the same number, will be found upon the waters of the Swatara. But supposing there are seventy, from three to thirty feet in thickness, which is an average of ten, to each of the seven mountains; and as there are thirty-six gaps, made by the Swatara and its tributaries, it follows that there can be *seven hundred and twenty openings*, one upon each vein, on each side of the gaps, where mining can be done without tunnelling, and above the water level. If tunnels are driven into the sides of the mountains, and steam engines are put upon the

veins to bring coal from below the base of the mountains, it is impossible to calculate the number of collieries, that can be located upon the one hundred and eight square miles of coal land in this mining district. But suppose there are only seven hundred and twenty operators in the gaps, at the mountain ends, and each of these mine upon an average, ten thousand tons annually, a quantity which is easily taken from an opening upon a three feet vein, the aggregate will amount to the enormous quantity of *seven million, two hundred thousand tons!*

This not over calculating the capacity of this district, however, extravagant it may appear, to one superficially acquainted with the subject. That such a quantity will be mined here in the present age, the committee will not pretend to predict. Our country is yet in its infancy, and our mineral resources are only in the commencement of developement. One thing, however, they may be permitted to say, that it is not *now* known what *can*, what *may*, and what *will* be done, in our coal fields in after times.

If we compare the capacity of the Swatara mining district, with the Newcastle district, in England, upon the Tyne, and the Wear, it will be found, both as it respects the quantity of the coal, and the ease with which it can be mined, to be vastly superior.

Upon the Tyne and Wear, there are only fifty-nine collieries, worked as all English collieries are, with steam engines, below the water level, and yet the quantity annually mined there, is *four millions of tons!* Coal cannot be had there by driving drifts into the mountain ends, or by sinking sloping shafts, three or four hundred feet, and putting engines upon the veins. They are obliged to sink perpendicular shafts to the depth of 1200 feet; and this great depth is not reached by one shaft, but by a shaft and steam engine under ground, with descending inclined planes, at an expense, sometimes of 150,000 pounds sterling. From some of these collieries, the amount of water, that must be pumped, is enormous, it being stated before a committee of the House of Lords in 1830, that the steam engines, were obliged to raise in some instances, eighteen times the weight of water, which they do of coal.

Besides all this expense, and these difficulties, which must be encountered by the English colliers, the amount of coal is small, compared with the quantity which has been shown to exist upon the waters of the Swatara; and yet the New Castle district is declared

by British writers to be the most important in England, both in regard to extent and productiveness.

The following is an enumeration of the different strata of rock and veins of coal in the New Castle coal field, published in the fourth volume of the "Transactions of the geological society" of London.

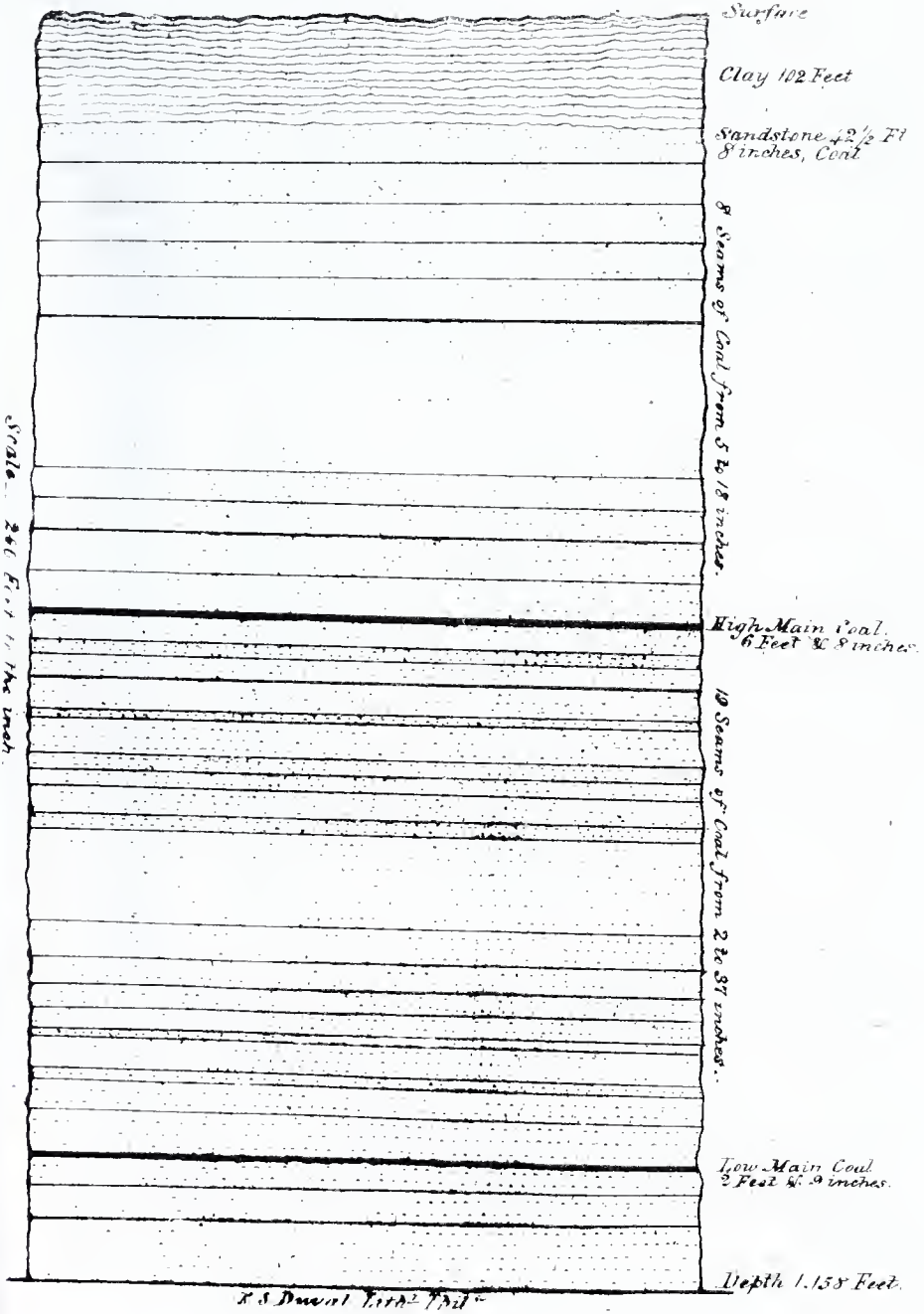
	Feet.	Inc.
1. From the surface of the ground through clay, to the depth of	102	
2. Through sand stone,	42	6
3. Seam of coal, which had only a thickness of		8
4. Through twenty-nine different beds of sand stone and shale, varying in thickness from thirty inches to forty-one feet, interstratified, with eight seams of coal from five to eighteen inches thick—in all	418	2
5. The High Main coal vein, having a thickness of	6	8
6. From the High Main coal vein, through fifty-two beds of sand stone and shale, from five inches to thirty-four feet in thicknes, interstratified, with nineteen different seams of coal from two to thirty-seven inches thick, amounting in all to	503	2
7. The Low Main coal vein having a thickness of	2	9
8. Through ten different beds of stone, from twelve inches to twelve feet in thickness, and two seams of coal of four and twelve inches, amounting together, to	82	1
Total depth.	1158	

In the foregoing are one hundred and twenty-five strata, and thirty two seams of coal; nineteen of which have been worked.

Diagram No. 8, exhibits the veins of coal in the New Castle coal field upon the Wear in the north of England.

NEWCASTLE COAL FIELD.

in England.


Surface
Clay 102 Feet
Sandstone 42½ Ft
8 inches, Coal
8 Seams of Coal from 5 to 18 inches.
High Main Coal
6 Feet & 8 inches
19 Seams of Coal from 2 to 37 inches.
Low Main Coal
2 Feet & 9 inches
Depth 1,158 Feet.
Scale 24 Feet to the inch.
R. S. Duncan Lith.ª Phil.ª

Thus it will be seen that the capacity of the New Castle coal field, which supplies the city of London with fuel,in which is mined, in fifty-nine collieries, four millions of tons annually, is small in comparison to that of the Swatara mining district. It is not yet twenty years since the first canal boat, loaded with Anthracite, left the coal region. Only thirteen years have elapsed since the commencement of the trade upon the Schuylkill. There are now, constantly employed, eight hundred and thirty-one coal boats upon the Schuylkill, and nearly as many more upon the Lehigh, the Susquehanna and the Lackawaxen. What the coal trade of Pennsylvania will be at the end of twenty years, will depend upon the progress of the arts, the prosperity of our country, and the wisdom of its councils.

The following table exhibits the quantity of Anthracite coal sent to market from the commencement of the trade in 1820 up to Jan. 1 1839, showing the annual increase and decrease :

	Tons.	Increase.	Decrease.
1820,	365		
1821,	1,073	608	
1822,	2,440	1,167	
1823,	6,823	3,583	
1824,	9,541	3,718	
1825,	33,493	23,852	
1826,	48,047	14,644	
1827,	61,655	13,618	
1828,	77,395	15,730	
1829,	105,083	27,688	
1830,	181,000	85,917	
1831,	177,000		4,000
1832,	379,000	202,000	
1833,	488,000	119,000	
1834,	377,486		110,514
1835,	555,936	179,450	
1836,	682,428	125,463	
1837,	864,751	176,221	
1838,	723,813		140,938

This does not include what has been mined in the Wyoming, Shamokin, Lykens Valley and Swatara districts, amounting now annually to about fifty thousand tons.

The decrease in 1828 was caused by the derangement in the money market, and the suspension of business in the eastern factories, which are now beginning to consume large quantities of Anthracite coal. As business has now revived, and the factories have resumed,

operations, it is probable that the quantity mined and sent to market from the Schuylkill, the Lehigh and the Lackawanna, will exceed next year a million of tons.

The history of the coal trade, and its effect upon the British Empire, admonish us of its importance in Pennsylvania. If we subscribe to the opinions of her eminent men; it is this that has enabled her to maintain more than seventeen millions of people upon a small and naturally unproductive island—to cover the ocean with ships—to hold half the world in subjection—to combine the energies of all Europe in the overthrow of the mighty conqueror, that in his rapid strides to universal dominion, was only checked by British influence and wealth—to undersell the world in manufactures—and to grow rich in despite of a national debt of eight hundred million pounds sterling.

Mr. M'Culloch, author of the British "Dictionary of Commerce," ays:

"Of the different minerals (in Great Britain) that of coal is by far the most important and valuable of them all."

"It is hardly possible to exaggerate the advantages England derives from her vast beds of coal."

"Our coal mines are the principal sources and foundation of our manufacturing and commereial prosperity."

"Since the invention of the steam engine, coal has beeome of the highest importance as a moving power; and no nation, however favourably situated in other respects, not plentifully supplied with this mineral, need hope to rival those that are in most branehes of manufacturing industry."

Mr. Porter, chairman of the Statistical society of London, and author of the "Progress of the Nation," remarks:

"It cannot be necessary to point out the many advantages which we derive from the possession of our coal mines, the source of greater riches than ever issued from the mines of Peru, or from the diamond grounds at the base of the Neela Mulla mountains. But for our command of fuel the inventions of Watts and Arkwright would have been of small account, our iron mines must have long since ceased to be worked. and nearly every important branch of manufactures whieh we now possess must have been rendered impracticable, or at least have been conducted upon a comparatively insignificant scale."

Mr. Buddle, an eminent engineer, in an examination before a committee of the House of Lords, in 1830, stated it as his opinion, that the manufacturing interests of Great Britain, as great as they were, rested principally upon the coal trade. He continued, "Should our coal mines ever be exhausted, it would melt away at once, and it need not be said that the effect produced on private and domestic comfort would be equally fatal with the diminution of public wealth. We should lose many of the advantages of our high civilization and much of our cultivated grounds must be shaded with forests, to afford fuel for the remnant of our present population."

Mr. Bakewell, the celebrated geologist, says:—"I may be permitted to remark, that however ancient the formation of coal and iron may have been, the frequent occurrence of these minerals together, both destined in future time to give to man an extensive empire over the elements, and to contribute largely to his means of civilization and comfort, cannot fail to impress the reflecting mind with evidence of prospective designing intelligence."

Professor Buckland has the following in his "Bridgewater Treatises."

"The amount of work done in England has been supposed to be equivalent to that of three and four millions of men by direct labour, and we are almost astonished at the influence of coal and iron, and and steam, upon the fate and fortunes of the human race. It is eighteen hundred feet below the earth's surface—it rows, it pumps, it excavates, it carries, it draws, it lifts, it hammers, it spins, it weaves, it prints." "We need no further evidence to show that the presence of coal, is, in an especial degree, the foundation of increasing population, riches and power, and of improvement in almost every art which administers to the necessities and comfort of mankind."

Coal was not used in England. previous to the beginning of the thirteenth century. About one hundred years afterwards, coal began to be imported into London from New Castle. It was at first, only used by Smiths, Brewers, Dyers and Soap-boilers, and this innovation was loudly complained of. A notion prevailed that the smoke was highly injurious to the public health; and in 1316, parliament petitioned the King, to prohibit the burning of coal, on the ground of its being an *intolerable nuisance.* Edward I, issued his proclamation, abolishing the use of coal, but it not being regarded,

resource was had to more vigorous measures. A commission of oyer and terminer was issued out, with instructions to enquire, who burned coal within the city of London, or parts adjoining? To punish them for the first offence, and upon a second, to demolish their furnaces, and to provide for the strict observance of the proclamation in all time to come! At length reason and experience gained the victory over prejudice, and in the reign of Charles I, the use of coal became universal in London. At the time of the Restoration, the quantity consumed, was supposed to amount to 244,000 tons; in 1670 the consumption had increased to 344,250 tons; in 1750 to 625,000 tons; in 1800 to 1,125,000 tons; and in 1832 to 2,139,078 tons. The consumption for gas in London, alone amounts to 230,000 tons annually.

At the commencement of the use of coal, England, as she *then* was, compared with what she *now* is, was a powerless, impoverished and petty kingdom. It is the product of her coal mines, that lies at the foundation of her unrivalled manufactures, her immense commerce, her wealth and power.

The quantity of coal consumed in Great Britian, and exported in 1836, was according to M'Culloch 22,709,000 tons. Mr. Porter stated from the chair of the statistical society of London, that this quantity was much below the real amount, and estimated it at 30,000,000 of tons. In 1834, there was exported to foreign countries 615,255 tons; 40,000 of which came to the United States.

The city of Glasgow, with a population of 202,000 inhabitants' consumed in 1831, 437,000 tons of coal. The consumption has since greatly increased, as this city now manufactures 200,000 tons of Iron annually. The glass houses of Leith consume 40,000 tons a year. Mr. Lea, in his letter on the coal region, estimates the amount of coal mined in South Wales, to be 4,000,000 of tons annually, as there were in 1836, 355,000 tons of iron made there.

The influence of coal upon the manufactures of Great Britain, may be illustrated from the following facts, chiefly taken from M'Culloch's Dictionary of Commerce.

In 1581, Parliament passed an act, restraining the iron works in consequence of the consumption of timber they occasioned. Soon after this, Edward Lord Dudley, invented the process of smelting iron ore with mineral coal, instead of charcoal, and obtained a patent in 1619. But he was nearly ruined, by his efforts to introduce and

perfect his process, and his works were destroyed by an ignorant rabble, who then supposed, that this improvement which has since given employment to millions, would deprive them of their work. But it was not until 1740, that the use of mineral coal, in smelting iron ore became general. At that period, the quantity of pig iron manufactured in England and Wales, amounted only to 17,000 tons, produced by 59 furnaces. From this period, it increased as follows:

Years.	Tons.	No. Furnaces.
1740,	17,000	59
1750,	22,000	—
1788,	68,000	85
1796,	125,000	121
1806,	250,000	169
1820,	400,000	—
1823,	469,561	277
1825,	615,236	259
1828,	703,184	278
1830,	1,000,000	376

Value of 1,000,000 tons pig iron, £7, per ton,	£7,000,000
Additional cost of forming, part into bars, bolts, &c.	1,250,000
Hardware and articles, manufactured of iron,	17,500,000
Total	£25,750,000

By the foregoing, it appears, that although only seventeen thousand tons of pig iron, were manufactured at the commencement of the use of coal, and the hardware, and bar iron was of so small an amount, that no estimate of it has been made by British writers, the manufacture has now increased, until its value is estimated at 109,332,223 dollars, annually. This does not include machinery made of Iron, of which there was exported in 1829, an amount valued at 256,539 pounds sterling. It is estimated, that 200,000 persons are engaged in the manufacture of pig iron, and 360,000 in the manufacture of hardware and cuttlery.

The quantity of pig iron made in the United States in 1830, was, according to an estimate of a convention of Manufacturers at New York, in 1831, 191,536 tons, in 239 furnaces, of which two-fifths are supposed to have been made in Pennsylvania. It is now supposed that the quantity manufactured, is at least 250,000 tons, of which 100,000 are made in this state.

It will be be seen that the number of furnaces in the United States nearly equals the number of Great Britain, but that the quantity of iron made is only one-fourth as large. This is owing to coal being used in the British furnaces, together with the hot blast, by which the yield is greatly increased. The immense works of Guest and Company, the largest in the empire, and of Crawshay and Company, located near Merthyr Tydvil, in South Wales, yield together 100,000 tons annually, a quantity equal to the whole amount of the Furnaces of Pennsylvania.

The committee believe, that a new era in the coal trade, and the and the manufacture of iron is is now commencing—an era which will produce results as great in Pennsylvannia, as the invention of Edward Lord Dudley, has in England—it is the introduction of *Anthracite coal*, in the manufacture of iron. On the seventh of February, 1837, George Crane, after successive trials and failures, during a period of fifteen years, succeeded in South Wales, in making iron with anthracite coal. In a speech delivered by him, at Swansey, on the 23d of February, 1838, he stated that he had used no other fuel for more than a year—"that the furnaces produced on an average, upwards of 50 per cent more iron,"—"that the iron had given much satisfaction for bars,"—that "for foundry purposes, it was admirable" —that in re-melting it was very fluid, and at the same time strong," and that he had produced, on the average of several months, a ton of pig iron, with about one-third of the coal, which he was before obliged to use of the bituminous kinds. A paper read by Mr. Crane to "the Chemical section of the British Association," on this subject is inserted in the appendix.

The success of Mr. Crane in Wales, naturally excited the attention of the people of the United States, and more especially those engaged in the coal trade and manufacture of iron, in Pennsylvania.—Experiments have been made, within the last year, in several furnaces in the eastern part of the state, most of which only partly succeeded, owing probably, to the wrong construction of the furnaces, or the feebleness and missapplication of the hot blast.

But the committee take great pleasure in stating to the Legislature and the people of Pennsylvania, that they believe that the smelting of Iron ore, with the American anthracite coal, is no longer an experiment. A letter has been received, which is inserted in the appendix, from Messrs. Baughman and Guiteau, dated January 2d, 1839,

in which they state, that their furnace at Mauch Chunk, has been in active operation, more than twenty days, with no other fuel than anthracite coal! If anthracite coal is now to be the fuel in the manufacture of Iron, we will leave it to others to conjecture its future demand.

The influence of coal upon the Woolen and cotton manufactures of the British empire, will be acknowledged, when it is known, that it keeps in motion fifteen thousand steam engines,one of which in Cornwall, it would require one thousand horses to be kept to produce the same work. The English early excelled in the manufacture of Woolen Goods, but in 1700 the whole value was only £8,000,000. In 1831, to value of woollen cloths was £21,000,000—£8,300,000 being paid to 350,000 persons engaged in the manufacture.

The cotton manufacture was unknown to the people of England, before coal was used in the propulsion of machinery. The invention of the steam engine would have been almost useless to them without their coal mines. In 1760, twenty years after coal was in in general use in making iron, the whole amount of their cotton manufactures was valued at two hundred thousand pounds. It is now the most extensive manufacture in the Empire and subsists 1,400,000 persons. In 1817, Mr. Kennedy, in a paper published in the "Manchester Transactions," estimated the number of persons employed in spinning cotton in Great Britain, at 110,763; and the aid they derived from steam engines, as equal to the power of 200,768 horses. The quantity of coal consumed in the manufacture of 108,350,000 pounds of cotton that year, amounted to 500,479 tons.

In 1832, there were 259,980,000 pounds of cotton manufactured in Great Britain. There must consequently have been employed in spinning, more than two hundred and sixty thousand persons, assisted by steam engines, with an aggregate power equal to forty-nine thousand six hundred and one horses, and consuming *one million one hundred and ninety-five thousand three hundred and thirteen tons of coal!* If the manufacture of cotton has increased since 1832, in the same proportion, there are more than 2,500,000 tons of coal consumed annually in Great Britain, in the spinning of cotton alone.

The following is the amount of the value of the whole manufacture in 1832:

Raw cotton valued at	£7,000,000
Wages of 800,000 spinners, weavers and bleachers,	18,000,000
Wages of 100,000 machine makers, smiths, masons and joiners,	3,000,000
Profits, superintendence, coal, wear and tear of machinery,	6,000,000
Total,	£34,000,000

One hundred and fifty-two millions, two hundred and twenty-two thousand, two hundred and twenty-two dollars!

The cotton manufacture of the United States is destined soon, greatly to increase the demand for coal. Already the eastern factories consume a very large amount. In a report of a committee to Congress, on the cotton manufacture of 1831, it is stated that the amount of raw cotton consumed that year to be 77,557,316 pounds; that the number of persons employed in spinning and manufacturing was 57,466, and the wages paid were $10,294,444.

The *earthen ware* manufacture in England, now consumes HALF A MILLION of tons of coal annually. In 1740, it was of no importance. The principal seat of its manufacture is located in the coal region, in Staffordshire where there is a district comprising a number of villages, having a population of 60,000 persons, the greater part of whom are engaged in the manufacture. The pipe clay from Dorsetshire and Devonshire, and flints from Kent, are conveyed by the canals, which intersect Staffordshire, to the places where the coal and clay abound, and there manufactured. The annual value of the manufacture is estimated at $10,000,000. In 1831, the value of earthen ware exported, was $2,039,844, of which an amount valued at $1,134,374 came to the United States.

But the influence of coal does not end here. It has not only created and supports the manufactures of the British island; but it has greatly increased its population, augmented its agricultural products, and is the very basis of its unrivaled commerce.

The market created in every part of England, by manufactures for agricultural produce, has caused commons to be inclosed, marshes drained, and economical farming to be studied. Great attention is paid to improving the breed of cattle and sheep. There are thirty four millions of acres in England, after deducting three millions for waters, roads, cities and towns, of which half is devoted to pasture

and the other half is under the plough. Upwards of three millions are in wheat—about three millions in oats and beans, and between two and three millions in barley. Were it not for the coal that drives the engines and smelts the ores, there would be no market for the produce of these millions of acres; and a large portion of these wheat fields would be shaded with forests, to supply fuel to the remnant of the population.

The POPULATION OF ENGLAND, in 1700, was about 5,500,000 persons. In 1801, the population of England, Scotland and Wales, was 10,942,646. In 1831, 16,537,398. It now probably exceeds 20,000,000. This increase of population is confined to the coal districts, and manufacturing districts depending upon coal. While the towns in the south of England, like Winchester and Canterbury, are either stationary or in a declining state, those in the north, situated in the coal fields, are rapidly increasing in population and wealth.

The following table exhibits the large population and the rapid increase of the cities dependent on coal for manufactures.

	1811.	1831.
Manchester,	93,573	182,812
Liverpool,	94,376	165,175
Birmingham,	85,783	146,986
Leeds,	62,534	123,393
Bristol,	76,433	117,016
Sheffield,	35,840	59,011
New Castle on Tyne,	27,587	42,760
Merthyr Tydvil,	15,720	22,083
Wolverhampton,	14,836	24,782

The large towns and villages that have sprung up around Manchester, and form really its suburbs, raise its population to 270,000; such as Charlton Row, which in 1801 contained only 675 inhabitants, in 1831 had 20,565. A continued range of great commercial towns cluster thick around New Castle. These are North Shields, South Shields, Tynemouth, Wearmouth and Sunderland; all of which are supported by the coal trade, and are equally prosperous.

If canals and rail-roads are carried into our coal fields, a similar picture of prosperity will be seen in Pennsylvania.

The influence of coal upon commerce has already been illustrated by its effects upon the products of industry. Such a vast amount o manufactures require a great amount of shipping to export it to other countries, and bring back the raw materials to be converted again into tonnage.

In 1663, the tonnage of Great Britain was only 95,000 tons, and in 1751, eleven years after the use of coal in making iron became general, it amounted to 609,000 tons, which is less than the tonnage sent this year from the Lehigh and Schuylkill coal mines to market. But mark the difference! At the end of 1834, the vessels belonging to the British Empire were 25,055, of 2,716,000 tons, and navigated by 168,061 men. The entrances and clearances for the coasting trade, amounted, in 1832, each to 8,500,000 tons. Besides these, in the same year, 4,546 foreign vessels comprising 639,979 tons, and navigated by 35,399 men, entered the ports of Great Britain.

There are five coal districts in Great Britain. 1. *Coal district north of the Trent.* 2. *Central coal district.* 3. *Western coal district.* 4. *Middle or Shropshire.* 5. *South Western.*

In the first coal district are the New Castle mines, forming only a part of the district; yet there are 1600 ships constantly employed in the trade of New Castle alone, and New Castle ranks, as a shipping port, second immediately after London. There were in Great Britain, in 1835, five hundred and twenty seven steam vessels propelled by coal.

Within the yast year an improvement has been made in navigation, as important as it was daring and successful. Steam vessels had hitherto been confined to bays, and channels, and navigable rivers. Even men of intelligence were in doubt and conjecture when the steam ships, Sirius and Great Western, were building, as to the success of the enterprize. But the time had come for steam to achieve another triumph. Provided with about four hundred tons of coal each, they boldly pushed into the ocean, and in fifteen days reached the western shore of the Atlantic, astonishing the commercial world at the ease with which the great project was accomplished. Since that time the ocean has often been traversed by steam, and the British Queen, the Liverpool, the President and the Royal William, have been added to the number of steam ships upon the ocean. This is but the commencement of Atlantic steam navigation. What it will be can only be left to conjecture. That the spirit and enterprize of the age will cover the ocean with steamers, and thereby produce a demand for coal, hitherto unknown even in England, can hardly be doubted. Experiments have proved Anthracite coal superior to other fuel in the generation of steam. It is used in the locomotive engines upon the Baltimore and Ohio rail-road, and will soon be the moving

power upon all the great rail-roads constructed and to be constructed between the Atlantic and the Allegheny mountains. The agent and engineer of the steamship Liverpool, assisted by several men of science, at the city of New York, in November last, after trying experiments with different kinds of coal, and rejecting the coal of Nova Scotia as not producing sufficient heat, gave the preference to the Anthracite coal of Pennsylvania, as the purest and most lasting, and capable of generating more steam with a less quantity.

As the state of Pennsylvania holds the same position, among her sister commonwealths, as the British empire holds in Europe—as abundance of iron ore, is found along the lines of her canals, from one end of the commonwealth to the other—as that portion of the state, lying west of the Allegheny mountains, comprising one third of her territory, is one vast Bituminous coal field; and as three great Anthricite coal fields, lie east of the Susquehanna, and near the Atlantic market; it is a measure of State policy, to extend canals where practicable, into every mining district, however great the expense. No well constructed canal to coal mines were ever unprofitable, and few canals, among the great number, in this country and in Europe, have ever paid the interest on their cost, when coal and iron have not formed a large portion of their tonnage; this is the experience of England, of France, and the United States.

In order to illustrate the importance of coal to canals, we extract the following from a "*Share List*," published in London, Oct. 12, 1833, in which the cost and present worth of the shares of more than 70 British canals, are inserted. Among the whole number, there is not one, the stock of which, is at par, on which coal is not transported.

BRITISH CANALS NOT IN THE COAL REGION.

North Walsham and Dilham canal, connects an agricultural district, with tide water, at the city of Yarmouth.

The shares cost	£50
They now sell for	10

Oakham Canal, leads from an agricultural district, in the interior of England, to the grand junction canal leading to London.

The shares cost	130
They now sell for	44

Wey and Arun canal, connects a rich agricultural district, with the city of London.

The shares cost	£100
They now sell for	32

Portsmouth and Arundel canal, leads from the Wey and Arun canal, through a rich agricultural district to Portsmouth.

The shares cost	50
They now sell for	10

The two last named canals, make an entire chain of inland navigation, from the city of London, the metropolis of the empire, containing, with its suburbs, 1,800,000 inhabitants, by the shortest route to Portsmouth, on the English channel, the great depot of the British Navy.

Regent canal, extends from Paddington, a sort of internal port, communicating with the principal canals of the kingdom, to the city of London.

The amount of each share is	100
They now sell for	16 15*s*.

Grand Surrey, runs through an agricultural country and enters London on the south.

The shares cost	100
They now sell for	22

Bassingstoke canal, commences in the interior of England, and running north-easterly more than thirty miles, unites with the Wey and Arun canal, leading to London. It lies wholly in an agricultural district.

The shares cost	100
They now sell for	5 5

Croydon canal, leads from an agricultural district, south of the Thames to London.

The shares cost	31 2½
The now sell for	1

Thames and Medway canal, connects a rich agricultural country, upon the river Medway, with the Thames below London.

The old shares cost	£30 $4\frac{1}{4}s$
They now sell for	1
The new shares cost	100
They now sell for	0

The *Great Caledonian canal* in Scotland, constructed by the Government, accross the island of Great Britain, with locks 20 feet deep, 40 broad, and 172 long, so that frigates of 32 guns, and merchant ships of 1000 tons burden, may pass through it, from the North Sea to the Western Ocean, lies out of the coal region, and *no coal* is transported upon it. It cost 986,924 pounds sterling The amount of toll in 1829, was only £2,575 6*s* 4*d*, while the ordinary expenses, during the same year, were £4,573 0*s*. $1\frac{1}{2}d$ How different would have been the result, if the 1600 vessels, that are constantly employed in shipping coal, from the single port of Newcastle, upon the Tyne, had passed through it.

The following are some of the

BRITISH CANALS UPON WHICH COAL IS TRANSPORTED.

The *Grand junction canal*, is ninety miles long, and was constructed at an expense of 8,888,888 dollars, from the coal mines near Coventry, to the city of London.

The amount of each share is	£100
They now sell for	245
Annual dividend per share	12

The *Leeds and Liverpool canal* is one hundred and twenty miles long, and by a circuitous route, connects the city of Leeds, with the commercial city of Liverpool. It runs through the coal region, and coal is transported on it to both cities.

The shares cost	100
They now sell for	470
Annual dividend per share	20

The *Coventry canal* lies wholly in the coal region from whence coal is transported, to the great manufacturing city of Birmingham.

The shares cost	100
They now sell for	600
The annual dividends are per share	32

The *Neath canal* extends from Neath on the Bristol channel into the coal field of South Wales. Nearly all its tonnage is coal and iron.

The shares cost	£107 10*s.*
They now sell for	290
The annual dividends are per share	15

The *Swansey canal*, extends from Swansey, on the Bristol channal, into the Anthracite coal fields of South Wales. Its tonnage is nearly all coal and iron.

The shares were originally	100
They now sell for	220
The annual dividends are per share	12

The *Cromford canal* is a short canal, lying wholly in the coal region, and supplies tonnage to other canals.

The shares cost	100
They now sell for	300
The annual dividends per share	18

The *Glamorganshire canal*, extends to the coal basin, in South Wales.

The shares cost	100
They now sell for	290
The annual dividends per share are	13 12$\frac{2}{3}$*s.*

The *Forth and Clyde canal*, in Scotland connects the cities of Edinburg and Glasgow. It is a canal of the largest class, having 10 feet depth of water, and admits vessels of considerable size. It was very difficult and expensive in construction, but running through a rich coal field it supplies the cities of Glasgow and Edinburgh with coal.

The shares were originally	100
They now sell for	545
The annual dividends per share are	25

The *Oxford canal*, extends from near Coventry, in the Birmingham coal field, to Oxford where it connects with the Thames, about fifty miles north-west of London.

The shares cost	100
They now sell for	595
The annual dividends per share are	32

The *Stafford and Worcester canal* runs through the coal region, and near the great manufacturing town of Wolverhampton.

The shares cost	£140
They now sell for	610
The annual dividends per share are	34

The *Somerset coal canal*, is a canal lying wholly in the coal region, and has no other tonnage, except coal for the city of Bristol.

The shares cost	50
They sell for	170
The annual dividends per share are	11

The *Mersey and Irwell canal*, runs nearly parallel with the Duke of Bridgewater's canal, only one or two miles to the north. Coal for the city of Liverpool, forms a portion of its tonnage.

The shares cost	100
They now sell for	750
The annual dividends per share are	40

The *Trent and Mersey canal*, runs through the coal region. It is covered with boats loaded with coal, and iron, running between Birmingham and Liverpool.

The shares cost only	50
They now sell for	640
The dividends are per share	37½

The celebrated *Duke of Bridgewater's canal*, was first designed to open a communication, between his extensive coal mines and the city of Manchester. It was constructed on a level so as to avoid the use of locks. The canal was carried through vast excavations, made partly in the interior of the mine itself; it was led by aqueducts over the public roads, and over the river Irwell, by a magnificent bridge, which left space for vessels, with sails spread, to pass beneath, the level was preserved by deep cuttings, by artificial mounds, and was sometimes supported by piles. It was at length completed—its length is fifty miles, costing his whole immense fortune, amounting to 350,000 pounds sterling, or 1,555,555 dollars. This canal immediately reduced the price of coal in Manchester one half, and yielded twenty per cent. on the outlay. *The annual increase, is now equal to the whole cost of the canal!*

Thus it appears that while the British canals, which depend upon agricultural products, and merchandize alone, are in every instance unprofitable investments of capital; the canals on which coal and iron manufactures are transported, yield in every instance large, and often enormous incomes.

Nor is this fact confined to the canals of England, Scotland and Wales. In Ireland, the *Grand canal* reaching from the city of Dublin to the Shannon, a distance, including its branches, of 156 miles through a thickly settled agricultural country, does not yield tolls sufficient to defray the expenses of ordinary repairs.

The *Royal canal* also extending in a more northerly direction, from Dublin to the Shannon, a distance of eighty-three miles, and costing 1,421,954 pounds sterling, yields in tolls about £1,300 annually, a sum not adequate to defray the expenses of ordinary repairs, and pay the persons employed upon it without paying any thing for interest of capital.

Ireland has coal mines, but they are not worked, and her canals have little or no tonnage from iron or coal.

In agricultural France there are several splendid canals, which have been constructed by the government. The *Briare*, 34½ miles long, intended to connect the Seine and the Loire. The *canal of Orleans*, which joins the Briare. The *Centre*, about 72 miles long, connecting the Loire and Saone. The *St. Quintin*, 28 miles long, joining the Scheldt and the Somme. The *Besancon*, 200 miles long, joining the Rhone and the Rhine. The *canal of Burgundy*, which is partly finished, 150 miles long, connecting the Rhone and the Seine; and the *canal of Languedoc*, connecting the Mediterranean Sea with the Atlantic Ocean, admitting boats of 120 tons burden. These works are mostly magnificent; and while they afford avenues to market, for the abundant harvests of the rich plains and sunny vine hills of beautiful France, and convenient thoroughfares for her internal trade, they want the homely, heavy tonnage of the coal mines of England and Pennsylvania to render them profitable.

France has coal in more than twenty departments, and yet her mines are not worked. In 1827, she paid England more than eight millions of francs for coal.

Should the investigation be pursued, it would be found that the canals of every country in Europe, and also in the United States,

unless a large share of their tonnage be mineral coal, or its inseparable concomitant the manufacture of iron, are *directly* profitless investments, although they may *indirectly* greatly benefit the states in which they are located by augmenting their general wealth and prosperity.

The canals of Holland may be an exception. But the Dutch canals were made so cheaply in that low and level country, being fed by the sea at high tides, and having no locks except at the ends, that the interest on their cost, is comparatively small. Besides the canals of Holland, are the common roads of the country, and engross its travel.

The *Grand canal* of New York, may be thought to be another exception. But this canal has, as yet, yielded little if any profit, after paying the interest on the cost of construction, the repairs and other expenses. Besides, it is as yet, the only continuous inland communication either by rail road or canal, between tide water and the great inland seas, upon our north-western border. When other lines of continuous canal, now in progress, from the seaboard to the lakes are completed—when our entire water communication is made from Philadelphia to lake Erie, and also to the Ohio river—when the Chesapeake and Ohio canal is finished to Pittsburg, and branches are extended from thence to Erie and Cleveland—when an inland navigation is made continuous from the Atlantic to the Ohio, by the James River and Kanawha canal—when a rail road, now partly made up the valley of the Mohawk, is finished to the lakes—when another is made from the city of New York, more south to the harbour of Dunkirk—when the great Erie rail-road is constructed from Philadelphia to the harbor of Erie, and another made south of this to the city of Pittsburgh—when the Baltimore and Ohio rail-road is completed to the Ohio river, much of the heavy tonnage which is now transported on the Grand canal of New York, will find its way to the Atlantic, on canals located in more southern latitudes, while the rail-roads, will share largely in the income now derived from light goods and passengers. The problem will then be solved, whether the New York canal, without the heavy tonnage of coal and iron, after paying the interest on its cost, its repairs, and the salaries of officers, will afford an income, equal to canals in this mineral commonwealth.

That it is a highly valuable improvement—that it will add to the

wealth, and increase the prosperity of the great and enterprising state that constructed it, in all time to come—that it reflects immortal honor upon its projectors and those who supplied the means of its completion, will be acknowledged forever. But at the same time, it can hardly be presumption to hazzard the conjecture, that the time is not distant, when the income derived from it, compared with that which will be derived from canals, connecting the Pennsylvania coal mines, with the Atlantic, will be like that now derived from the Languedoc canal in France, compared with that derived from the Duke of Bridgewater's, and the Trent and Mersey canal, in England.

That we cannot be mistaken in reference to the importance of coal as a tonnage upon canals, is evident, from the great revenue derived from those, which have been constructed by joint stock companies, to reach our coal mines.

The *Lehigh navigation* was finished in 1819, from Easton on the Dalaware to Mauch Chunk, upon the Lehigh, near the extensive anthracite coal mines, the coal of which has since formed nearly all its tonnage. The canal is 46¾ miles long, and was constructed at great expense, and in the most substantial manner. The locks are 100 feet long, by 22 wide, being calculated for boats of one hundred and fifty tons burden. It cost one million of dollars, and is divided into shares of fifty dollars each. The company have mining privileges, and have constructed two rail-roads, which are undoubtedly a drawback upon the income of the company, and yet the stock sells for eighty-seven dollars per share, or seventy-four per cent above par.

The *Schuylkill Navigation* is 108 miles long, from Philadelphia to Port Carbon, above Pottsville. It penetrates the Schuylkill mining district, and connects it with the seaboard. It was finished in 1824, and cost two millions, nine hundred and sixty-six thousand, one hundred and eighty dollars. Boats of sixty-six tons burden navigate this canal. Other tonnage than coal is comparatively trifling, and dividends are limited by the charter to a certain amount. Yet it is the best canal stock inthe United States. The shares were originally, only fifty dollars each—they now sell for *one hundred and seventy*, or two hundred and forty per cent above par.

The committee will conclude their report, by calling the serious attention of the Legislature, to a public improvement, which if it were enlarged to the proper dimensions for the transportation of

coal would not only equal in revenue, the canals upon the Schuylkill and the Lehigh, but would greatly benefit the public works of the state, besides opening one of the best and most extensive mining districts in the commonwealth.

The *Union canal* extends from the Pennsylvania canal, on the Susquehanna, to the Schuylkill canal leading to Philadelphia. The great object of this improvement was, originally to open an avenue to Philadelphia, for the trade of the west, which concentrated upon the Susquehanna. It will be seen therefore, that it is a continuation of the great chain of inland navigation, through Pennsylvania, from the western waters of the Atlantic, and it is the only possible route for a water communication, within the limits of the State. This canal occupies the ground, which should form the great out-let to market, not only for the western trade, the produce of this agricultural commonwealth, with its iron and lumber trade, but a vast anthracite and bituminous coal trade, and yet, owing to its condition, and diminutive size, not being able to admit boats of the Schuylkill and Pennsylvania canals, with which it connects, heavy tonnage cannot be carried upon it, without loss. The expense of transportation o coal, amounts to a prohibition of the trade, while rail roads lately constructed from the Pennsylvania canal to Philadelphia, draw off most of the tonnage, upon light goods and valuable merchandize. These causes have rendered the Union canal, with all its advantages unprofitable.

A feeder and branch canal, has been constructed, twenty-two miles, to the Swatara mining district, but as coal is a cheap article, and the profits upon a single ton small, it cannot be carried, with profit, upon a canal of the dimensions of the Union, when a navigation of more than double the capacity, runs parallel with it, from the coal region to the same market. Upon a canal of more than one hundred miles in length, of the size of the Schuylkill the expense of transportation generally equals the value of the coal at the place of its shipment. Upon a canal of the dimensions of the Union, it amounts to nearly twice its value. With the exception of the difference in toll, the expense is the same, of taking to market twenty-five tons of coal in a small boat upon the Union, as of fifty-five tons in a large boat, upon the Schuylkill. The consequence, therefore, is that unless the canal is enlarged, no coal can be sent from these extensive and valuable mines to Philadelphia, in competition with the coal of the

Schuylkill. For the last two or three years from 12 to 17,000 tons annually have been mined, by two or three operators, and sold along the banks of the canal, and also along the Pennsylvania canal, from Harrisburg to Columbia. But the moment this coal reaches the Susquehanna, it comes into unequal competition, with the coal of Lykens valley, the Shamokin and the Wyoming, which is brought to market, on the broad Pennsylvania canal, in boats holding from sixty to seventy-five tons. The superior quality of the Swatara coal, has enabled the operators to sell at an advanced price, and without loss, but not at such a profit as to produce an extension of the trade. Those who have embarked in the business, have done so under the firm conviction, that a wise policy would soon prevail in the councils of the state, and cause the enlargement of this important public work.

A company has obtained a charter to continue the Pennsylvania canal to the waters of the Chesapeake. This canal, of large dimensions, will be completed during the coming summer, and open another atlantic market for the coal of Pennsylvania. To this market the Swatara mining district is the nearest in the State, and if the Union canal is enlarged to the size of those with which it connects, an immense amount of coal will not only be sent down the Swatara with profit to the Chesapeake, but also to the Delaware, and the Union canal, be rendered as profitable as any in the state. Having a choice of markets, by the enlargement of the canal, the Swatara coal can successfully compete with any other, and nothing but the demand can limit the amount that will be mined and sent to market from this extensive district. That the demand for Anthracite coal, now amounting to nearly a million of tons annually, is destined to increase with accelerated rapidity, none acquainted with the progress in steam power and the improvements in the iron manufacture, will question. When the demand is one-fourth as great as it is in Great Britain, it might be mined upon the Schuylkill, and the Lehigh, and the Lackawaxen; but it could not be transported on their canals to market.

The enlargement of this canal is destined greatly to increase the revenue of the state. As it respects the tonnage which it will bring upon the state works, no accurate calculation can be made. What can be sent from the Swatara mining district may be inferred from a description of it in another part of this report. Every hundred tons sent to Philadelphia, will augment the trade of our commercial me-

tropolis, increase the tolls upon the canal, and add to the wealth, the commeree and population of the state. Every hundred tons sent to the Chesapeake Bay, will, at the present rate of tolls, yield a revenue to the state of more than twelve dollars; and the moment that the same amount of coal is sent from the Swatara distriet to the Chesapeake, as was last year sent from the Sehuylkill to the Delaware, the commonwealth will derive an annual income of more than SIXTY-SIX THOUSAND DOLLARS, in tolls, on the eighteen miles of her eanal between the mouth of the Swatara and Columbia.

It is therefore the unquestionable policy of the state, to extend the branehes of her public works into all her mineral districts, and rieh and extensive coal fields---to eonstruet them with reference to the heavy tonnage of coal and iron, as the means of paying the public debt incurred in eonstrueting her splendid system of internal improvement.

When the Bituminous coal of the Juniata and Susquehanna, and the Anthraeite of the Shamokin, Lykens valley, and the Swatara, shall find an outlet to the waters of the Chesapeake, and a communieation for the Anthracite of the Wyoming shall be made to the interior of the State of New York, then will Pennsylvania reap the rieh harvest of her enterprize in the immense ineome whieh will flow into her treasury.

HENRY K. STRONG,
GEO. N. ECKERT,
A. HOLMES,
JOHN STEES,
WILLIAM LEVAN.

APPENDIX.

At a meeting of several citizens of the city of Philadelphia, and of the counties of Columbia, Schuylkill, Berks, Lebanon, Dauphin, Perry and Cumberland, held at Pinegrove, September 15, 1838, the following, among other resolutions, was adopted, viz:

"*Resolved*, That a committee of five persons be appointed to publish a description of the Swatara coal region—to estimate the amount of tonnage which the enlargement of the Union canal will bring upon the state works, and to exhibit the advantages which the whole commonwealth will derive from making an outlet for the Swatara coal."

The chairman appointed Henry K. Strong, George N. Eckert, A. Holmes, and John Stees, of Schuylkill, and William Levan, of Philadelphia, the committee to report to a state convention to be afterwards holden at Harrisburg.

At a convention of delegates from several counties of the commonwealth of Pennsylvania, in favor of the enlargement of the Union canal, held at Harrisburg December 4, 1838. Mr. Strong, of Schuylkill, after stating that the committee appointed by the meeting at Pinegrove, were not prepared to submit their report, offered the following, which was considered and adopted, viz:

"*Resolved*, That committees be appointed to prepare descriptions of the several coal fields and deposits of iron, and other natural produce of Pennsylvania; also an exhibition of facts showing the amount of tonnage which the enlargement of the Union canal will bring upon the public works, and its effect upon the revenue of the state; and to transmit the same to both houses of the legislature."

The following committe was appointed for the *Swatara mining district*: Henry K. Strong, George N. Eckert, A. Holmes, John Stees, and William Levan.

Communication of George Crane, of Yniscedwin Iron Works, in South Wales, to the chemical section of the British association, *on the smelting of iron with Anthracite coal.*

"The great extent of the deposite of that description of fuel called anthracite, or stone coal, in the Mineral Basin of South Wales, accompanied, as it is, with iron mine in great abundance, and of good quality, has long made it an object of great interest to parties connected with that district, to discover some method of applying that description of coal to smelting purposes. One of the earliest patents enrolled in this country for this object, was that of Mr. Martin, in 1804. From the mode detailed in his specification, there does not appear to have been any peculiarity in his process; he evidently expected to have succeeded in using this fuel by the only mode of blowing a furnace then known, that by cold blast. Another patent was taken out about twenty years afterwards, for a mode of forming a conglomerate coke, composed partly of the small of the anthracite veins, locally called culm, with a sufficient portion of the small of the bituminous or binding veins, to cement the whole when coked in an oven together; had this latter plan been attended with success, its application would of course have been limited to those localities where the two descriptions of coal were to be found near each other.

The Yniseedwin Iron Works, which are in my possession, are placed upon the anthracite formation. Until I discovered the method of applying this particular description of fuel to the smelting of iron ore, I was obliged to avail myself of the coal of the bituminous veins, obtained from the adjoining parish of Rilly bebil, for the supply of the blast furnaces at Yniscedwin. During the fourteen years in which I have been engaged in the iron trade of South Wales, I have had my attention anxiously directed to the application of anthracite coal to smelting purposes, and at different periods, at a large outlay, tried a variety of plans, but without success, until the idea occurred to me that a hot blast, upon the principle of Mr. Nelson's patent, might, by its greater power, enable me to complete the combustion of this peculiar coal. I have now the pleasure of reporting to this meeting, that I have completely succeeded in the application of anthracite coal to the smelting of ironstone and ore.

That I have used no other fuel in a cupola blast furnace since the 7th of February last, and that the success of the experiment in the

combination of hot or heated air, with the coal in question, as fully detailed in the specification of my patent of improvement, enrolled in March last, has been in every respect of so satisfactory a description, whether with regard to the quantity of the iron produced, the quality of such iron, and the economy of the process, that I am now, and have been for the last three months, actively engaged in making the necessary preparations for the introduction of anthracite coal, instead of the coke of the bituminous veins, upon the whole of the blast furnaces which I at present have (three in number) at the Yniscedwin Iron Works: that I have renewed all my mineral takings in the anthracite part of the basin for ninety-nine years, and that I have made arrangements in contemplation for a large extension of the work, in consequence of the perfect success which has resulted from the experiment.

One of the three furnaces at present on my establishment, is a small cupola furnace, which we call No. 2, built from the top to the hearth with firebricks only; this cupola is of the following dimensions: Forty-one feet in its whole height; ten feet and a half across the boshes, and the walls of the thickness of two nine-inch bricks; the hearth three feet six inches square, and five feet deep. The two other furnaces which we call No. 1 and No. 3, are thick stone-walled furnaces. Some years since I found that this cupola furnace, No. 2, had on the average of a long period, (I concluded from the smallness of its dimensions and the thickness of its walls,) taken so large an excess of minerals to the ton of iron produced, when compared with the quantity taken on the average of the same period by the stone-walled furnace, No. 1, standing within fifty feet of it, that I determined to erect a second furnace, similar to the latter one, in lieu of it.

The meeting will shortly understand why I am giving these details, which may appear not to be very interesting particulars. This furnace cupola No. 2, not being at work when I arrived at the determination to try the experiment of the combination of the hot blast and anthracite coal upon the large scale, it was more convenient to put this furnace into blast for the purpose, rather than to interfere with the usual progress of my business by experimentalizing in either of the two other furnaces. The cupola furnace, No. 2, from the causes which I have before explained, had on an average of a long period taken cokes, the produce of five tons three cwt. of coal to the ton of pig iron, when the stone-walled furnaces had not required cokes to the

ton of metal produced quite equal to four tons of coal. The consumption of ironstone and lime stone had been greater in the former than in the latter description of furnace, but not to so great an extent.

I will make one other explanatory remark on this part of the subject. The two descriptions of furnaces have worked in so different a manner with the minerals of my neighborhood, that whilst the barrow of cokes, weighing about three and a half cwt. would take, when consumed in either of the stone walled furnaces, a charge or burden of five to five and a half cwt. of calcined iron mine, of the descriptions obtained in my neighborhood, according to the kind of iron which I was desirous of producing, the same barrow of cokes in the No. 2 cupola, or thin-walled furnace would only carry from three to three and a half cwt. of calcined mine of the same kind. Under these disadvantageous circumstances, I have actually produced from the No. 2 cupola furnace the ton of iron in the smelting process, on the average of three months, with less than twenty-seven cwt. of anthracite coal. The heating of the blast, and calcination of the mine require, of course, upon my plan, the same quantity of fuel, which is necessary for the like processes in other establishments.

With regard to the quantity of iron produced, the result which I have to report is equally satisfactory. I must not, however, omit to mention that for the greater convenience of filling this cupola furnace No. 2, from an adjacent gallery, previous to the commencement of my anthracite experiment, I raised it in height from thirty-six feet six inches to forty-one feet; this might have had some effect upon reducing the excess of the consumption of fuel when compared with that which had taken place in the No. 1, and might have increased its power of smelting with my blast of one quarter pound upon the square inch pressure, only from its former average of twenty-two tons to twenty-four. Since I have adopted the use of anthracite coal combined with hot air, my make in the No. 2 cupola furnace, with the same pressure of blast only, has ranged from thirty to thirty-four and thirty-six tons, and one week we actually tapped within three cwt. of thirty-nine tons of grey iron from this furnace; its present weekly average may be expected to range from thirty-five to thirty-six tons.

With respect to the quality of the iron produced by the combination of hot blast and anthracite coal, the result which I have to communicate will be very satisfactory; it is well known in my

neighborhood that my cold blast iron for all purposes, where great strength was required, was never deemed inferior to any smelted in South Wales; that which I have hitherto produced with hot blast and anthracite coal is, however, decidedly stronger than any other before smelted at the Yniscedwin Iron Works.

Relying upon the representations of chemists, that anthracite coal is almost entirely composed of pure carbon, I have always indulged the hope, that in the event of my ever succeeding in discovering a method of applying this fuel to smelting purposes, that I should be able to produce a quality of iron not very dissimilar to that formerly obtained by smelting with charcoal; how far the expectation will be realized further experience must prove; but, as far as my experience of the quality of this particular description of iron up to the present time has gone, I am sanguine with respect to the result. I shall be happy at any time to offer every facility in my power to any parties who may be deputied by this association, or by any other scientific body, to thorougly investigate this important subject.

If I have not trespassed already too long upon the time of the Section, its members may not be uninterrested in being informed in what manner the idea first occurred to me of applying heated blast to anthracite coal. One evening after I had placed a piece of it upon my parlour fire (which had before been made up with bituminous coal) and had allowed it to arrive at a red heat, upon my applying as fierce a blast to this piece of coal as I could raise from a pair of bellows, I noticed the appearance of a black mark or spot upon that part of it where the air impigned upon it; on my continuing the like rapid current, in the same direction, I shortly blew the fire out of it I at once perceived that the effect of the strength of the current of air, when cold, which we of necessity are obliged to blow into our furnaces to secure the passage of the blast through the high and dense column of materials contained in an erection like a blast furnace, instead of encouraging ignition, was actually unfavorable to it. On giving the thing but a moment's reflection, the question promptly occurred to me, what would be the effect of turning a blast into a furnace upon this coal, which would itself melt lead? I at once determined that it was a thought which was really worthy mature reflection. The further consideration which I have to the matter, and the further experiments which I shortly afterwards instituted, (which were continued at a great expense for some months,) have at

length been crowned with full success, which I have now had the pleasure of reporting to this meeting.

The anthracite formation probably occupies about one-third of the Mineral Basin of South Wales; it commences near the upper part of the vale of Neath, in the county of Glamorgan, and proceeds in a westwardly direction through the remainder of that county, thence through that of Carmarthen, and crops out, as I am informed, in the sea, in St. Brides Bay, after passing through a considerable portion of the county of Pembroke. It is likewise to be found in France, Austria, Bohemia, and Sardinia, in the Old World; and very large deposites of it have been already discovered on the continent of America, particularly in the state of Pennsylvania.

LETTER from J. Guiteau, of the firm of Guiteau, Baughman, High and Lawthrop, of Mauch Chunk, to the committee, announcing their success in SMELTING IRON ORE WITH AMERICAN ANTHRACITE COAL.

PHILADELPHIA, January 2d, 1839.

GENTLEMEN:—Your letter to Col. High of Reading, was received this morning, it having been forwarded to me by nim, requesting a reply.

In the fall of '37, an arrangement was made by Mr. Joseph Baughman and myself, with Col. High, by which he was to aid with funds, and any intelligence he might possess, to enable us to make a successful operation in the use of "*American Anthracite*," as a fuel, in the smelting iron ore. We procured the use of a furnace at Mauch Chunk—it was altered in the stack, &c. in some important particulars to meet our views, but the wind arrangements were very defective, and besides affording air for our furnace was used to supply a cupola and four blacksmith forges, and taken together, was an old rickety establishment; with these disadvantages, was also the want of ordinary water power, by reason of drouth. With these arrangements, however, we succeeded in making many hundreds of good Iron, with cold air, in a workmanlike manner, keeping

a chill off the hearth and the furnace, otherwise working in a fair manner, using about 80 per cent of Anthracite as a fuel. Those who saw its operation, were satisfied of the correctness of our position, and that we could easily overcome the serious difficulties, which all preceding operators in this field, had encountered; that is to say, the hearth being kept free, it did yield its Iron, in the usual manner, without conglomeration. The throat of the furnace, or bottom of the boshes, was kept free from congelation or bridging over, and the Tewyers kept bright; but our water totally failed, and the working of the furnace was necessarily suspended.

But being satisfied of our ability to perfect this important object, we built a furnace, and put it into successful operation, using sheet iron cylinders to generate hot air. These however, burnt out and burst in a few days, and we were again compelled to suspend our operations in consequence. We had made, during this essay of a few days, many tons of good iron, for forge or foundry purposes, and most of it the produce of Anthracite alone as fuel.

We have since arranged our furnace with cast iron pipes, at the tunnel head, by which means we heat our air with fuel used in smelting the ore, or heat thrown off in that process, and thus save a large amount of fuel, wasted by all other operators in this field, with anthracite. We have by these means, (our present arrangement,) had our furnace in uniformly healthy action, more than one month, USING ANTHRACITE ALONE AS A FUEL, more than twenty days successively, and without alteration in the fuel used. Our keepers declare they never worked a furnace with greater ease or comfort. The tewyers are uniformly bright, and the hearth always supple or limber.

Our hearth, (as per letter received yesterday,) stands as well as is usual in other furnaces, under similar circumstances of blast, burthen, &c. It equals our most sanguine expectations. The yield of iron is abundent for the quantity of ore used, or the *capacity* of the furnace. The Iron made is of good quality, it being soft, compact, strong and equal in texture, smooth in castings, from cupola, used in the forge, yielding much over common yield, makes an iron easily wrought, malleable and strong, neither cold nor red short.

We have used various ores from different localities, calcarious, silicious, &c. and our success has been equally good with them properly treated.

The anthracite used by us principally has been gray and white ash, pure, but of hard and compact texture, we have also used the softer coals, and from our observations had to think those coals work easier and faster, when pure and fracture readily. As the distinctions of red and white ash are not common where wo have operated, our essays have not tended to elucidate the relative value of those varieties.

Gentlemen, it would give us great pleasure to communicate with the utmost frankness, and without any reservation, all and every intelligence upon this matter, particularly as you intimate a wish to that effect; but prudential considerations, common to all persons thus circumstanced, seem to admonish us, that it is hardly proper at present; although we hope to be able to do so, within a short period, that the state and the nation without reserve, may be able to apply it profitably wherever anthracite or iron ore are found.

Should any gentleman wish to see our furnace, which is now in successful operation, we will with great pleasure show and explain its use. Mr. Baughman is constantly there, and will communicate with great frankness and plainness, whatever it is proper to relate.

I am Gentlemen,
with great respect,
your obed. servt. in haste,
J. GUITEAU.

To Messrs. Henry K. Strong, and A. Holmes, committee, &c. Harrisburgh, Pa.